



## Appendix 9: Monitoring Objectives for Southeast Coast Network Parks



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**Revision History**

Date	Description
15 August 2004	Submitted with final version of the Phase I Report.
15 February 2005	Monitoring questions converted to specific monitoring objectives. List of objectives revised based on data management planning process. Non-programmatic objectives eliminated from consideration.

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## Overview & Methods

Identification and prioritization of specific monitoring questions is critical to the identification of Vital Signs. Because the Southeast Coast Network (SECN) is taking a resource-allocation approach to selecting vital signs (see Appendix 4), parks' individual priorities of monitoring questions comprise one of three primary data sets to be used in the analysis and selection of vital signs (Figure A9-1).

Monitoring questions included in the tables were compiled from the Phase I and Phase II reports from the first twelve Inventory and Monitoring Networks to receive funding where specific monitoring questions were clearly identified (Milstead and Stevens 2003, Emmott et al. 2003, Hubbard et al. 2003, Leibfreid 2003, Welch 2003, Weber 2003). Where appropriate, monitoring questions were also included from EPA's Draft Report on the Environment 2003 (United States Environmental Protection Agency 2003).

Questions are divided into three broad categories: Environmental Setting, Park Resources, and Agents of Change. Questions in the "Environmental Setting" category include resources that provide the primary drivers of ecosystem structure, function, and composition, though in most cases they are not actively managed by the parks due to the spatial and time scales involved (i.e., water, air, geologic, and weather resources). Park resources refer to those that are managed at one or more spatial and temporal scales ranging from individuals to ecosystems. Agents of change include both natural and anthropogenic drivers.

Monitoring questions were reviewed by all fifteen management units in the network and categorized into standardized priority rankings ranging (Table A9-1). In each case, the goal of the scoping meetings was to determine the degree of importance the *answer* to any given question from conservation and a park management / mission standpoints. Initial rankings were established during scoping meetings between Network and Park staff between February and July 2004 (Table A9-2). Additional questions were added to the list during scoping sessions with individual parks. Follow-up phone interviews were conducted with park staff during July 2004 to complete the data set. For each question the overall average score was calculated, as well as an adjusted average score based only on scores at which a monitoring question would be considered relevant (i.e., scores for marine or coastal issues were only averaged among coastal parks). Individual park scores, average scores, and adjusted average scores are presented in Table A9-4.

Monitoring questions and the Park priorities thereof are expected to be revised based on feedback received from conceptual modeling workshops, ongoing data mining, and refinement of decision-making models during the development of the Network's Phase I and Phase II reports. Furthermore, as parks continue with adaptive management of their natural resources, priorities might also change; reassessment of these priorities are likely to be a component of the Network's five-year programmatic review of the overall monitoring program.

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## Key Findings

Issues of highest importance to parks in the Southeast Coast Network fall into seven broad categories (Table A9-4). Notes as to the justifications for scores are included in Table A9-5.

1. High Priority Ecosystems & Habitats. The Southeast Coast Network contains multiple habitat types. The following six systems / habitats had the most commonality among Network parks. Conceptual models for each system are detailed in Appendix 7.
  - a. Upland Forests (pine / hardwood). Nearly all parks have upland forest communities, though those community types vary widely across the Network. Natural systems within the network are marked by high levels of plant diversity, and more often than not historical dependence on fire as significant landscape-level drivers of ecosystem function.
  - b. Bottomland Hardwood and Riparian Forests. CONG contains the largest contiguous old-growth bottomland hardwood forest in the Southeast.

- c. Rivers & Streams. Six parks within the network contain or are bordered by significant river systems ranging from upland to coastal plain drainages: Chattahoochee River National Recreation Area (CHAT), Kennesaw Mountain National Military Park (KEMO), Horseshoe Bend National Military Park (HOBE), Ocmulgee National Monument (OCMU), Congaree National Park (CONG), and Moores Creek National Battlefield (MOCR). In addition to the six parks that contain large rivers, CAHA and CUIS contain smaller freshwater systems.
  - d. Coastal Wetlands / Salt Marshes. Wetlands within SECN parks vary widely from intermittent interdunal pools to riparian floodplains to vast salt marshes. These systems are particularly sensitive to changes in water quantity. TIMU is the “type” location for *Spartina* salt marshes in the Southeast.
  - e. Estuarine and Nearshore Marine Systems. Nine parks within the network contain significant estuarine or marine waters: Cape Hatteras National Seashore (CAHA), Cape Lookout National Seashore (CALO), Fort Sumter National Monument (FOSU), Fort Pulaski National Monument (FOPU), Fort Frederica National Monument (FOFR), Cumberland Island National Seashore (CUIS), TIMU, FOMA, and CANA. Mosquito Lagoon at CANA is another significant brackish water body. Intertidal zones provide critical foraging and nesting habitats for many sensitive and protected species such as shorebirds and sea turtles. These areas are threatened by visitor uses, and predation from both native and non-native species.
  - f. Coastal Dunes & Barrier Islands. Coastal dunes are major habitat features at CAHA, CALO, CUIS, and CANA. Future land acquisitions at TIMU might result in the addition of dune habitats there as well. Coastal dunes are particularly important due to the fact that (a) they support a wide variety of sensitive or protected species, (b) they are fragile, (c) they are particularly threatened by visitor uses, and (d) they play a significant role in the overall stability of the island..
2. Exotic Plant Management and Control. Monitoring questions related to exotic plant management were the only questions consistently of high priority across all parks within the network. Currently only parks within Florida are included in an operation exotic plant management program: Canaveral National Seashore (CANA), Timucuan Ecological & Historic Preserve (TIMU), Fort Caroline National Monument (FOCA), Castillo de San Marcos National Monument (CASA), and Fort Matanzas National Monument (FOMA). Beginning in FY 2005, the remaining parks within the network will be included in a three-year pilot program to identify and remove exotic plant species. Monitoring needs related to identification of sites of existing exotic plants and tracking the success of management actions will be critical for the long-term success of this program.
  3. Water Quality. In general, questions relating to water quality were high across all parks also, but the water bodies among the park vary substantially across the Network.
    - a. Estuarine / Lagoonal. Water quality in these systems is almost entirely driven by upstream or up-shore factors outside National Park Service boundaries or jurisdiction, and water quality monitoring is in general conducted by the various coastal states. Currently University of North Carolina at Wilmington, The University of Georgia, and The University of Florida are investigating watershed / landscape level influences of estuarine water quality at CAHA, CALO, FOPU, CUIS, TIMU, and CANA.
    - b. Coastal. Six parks (CAHA, CALO, CUIS, TIMU, FOMA, and CANA) contain significant areas with access to marine / ocean waters. In all cases except CANA, NPS jurisdiction extends only to mean high tide; CANA’s jurisdiction extends ½ mile east of the shore line. Threats to coastal water quality include non-point source chemical contaminants from up-shore as well as marine debris.
    - c. Riverine. With the exception of the rivers contained within CONG, all other parks contain limited portions of the watersheds that the rivers drain. Adjacent land use and upstream development

pressures are consistent threats to water quality among the river parks, but the types of land use and development pressures range widely from agriculture / animal husbandry operations, to extremely dense urban and suburban landscapes.

4. Geology & Geomorphology. Nearly all lands within the Network can be characterized to some degree by their geomorphic *instability*.
  - a. Coastal Geomorphology. All coastal parks are experiencing geomorphic changes either through accretion or erosion. Though these processes are natural in barrier island ecosystems, the current rates and locations of accretional and erosional zones are likely outside natural norms. Non-natural factors that are suspected to influence erosion and deposition rates include dredging operations, jetty and pier construction / placement, and hardening of shorelines.
  - b. Stream Bank Erosion. Stream bank erosion and stability is a major concern at CHAT, HOBE, KEMO, and OCMU where hydrologic modification resulting from upstream watershed development and hydropower facility management has resulted in altered riverine flow regimes.
5. Water Quantity. Water quantity issues in general are currently of concern, but will likely become larger during the next 10-20 years as water demands in the Southeast increase.
  - a. Surficial. River systems provide the majority of drinking water for the southeast. Major water supply reservoirs are located upstream of HOBE, CHAT, OCMU, and CONG, that serve the areas of Montgomery, AL, Atlanta, GA, Macon, GA, and Columbia SC respectively. The amount of fresh water that reaches estuarine systems is likely one of the major drivers that influences estuarine and salt marsh ecosystem health.
  - b. Groundwater. The Floridan aquifer is the main water supply source for agricultural and industrial needs along the southeast coast. The degree to which withdrawals affect park resources is not known, but as demand increases, the potential for impacts on park ecosystems could increase.
  - c. Effects of hydrologic modification. In addition to the average amount of water available within parks, the timing and distribution of flooding events is also changing due to upstream or watershed land use activities. In general flooding frequency of major floods has decreased during the last twenty years, and hydropower “peaking” operations have introduced a flow regime in riverine ecosystems that is outside expectations in natural systems. Multiple other water diversion structures occur in or near parks for agricultural, pest control, or transportation purposes.
6. Fire Management (effects, risks, and planning). Twelve of the network parks currently have or are in the process of developing fire management programs. The activities that will be conducted at each park will vary widely from suppression to routine prescribed burning. In all cases, climatic data relating to fire risk will be useful for fire management planning and risk assessment. Programs implementing prescribed burning would benefit from fire effects monitoring.
7. Threatened, Endangered, and other Species of Management Concern. More than twenty species were identified for potential monitoring across the Network, though with very few exceptions, those needs were only relevant at 1-2 parks due to limited species’ ranges. In general, species-specific monitoring questions had the largest difference between overall average scores and adjusted average scores. In nearly all cases, floral and faunal differences among parks were large enough that few species’ ranges span more than three parks. Exceptions include shorebirds, marine turtles, and multiple exotic plant and animal species. The following include species whose distribution occurs across six or more parks *or* whose impacts are large.
  - a. Feral Hogs. Eight parks in the network have current, historic, or potential infestations of feral hogs: CAHA, CANA, CASA, CONG, CUIS, FOFR, OCMU, TIMU. Active eradication programs are occurring at OCMU and CUIS.
  - b. Shorebirds. Plovers, oyster catchers, least terns, and wood storks are of large concern at all coastal

beach parks. Active monitoring occurs at CANA, CUIS, CAHA, CASA, and CALO, those these efforts are not currently coordinated.

- c. Marine turtles. Marine turtles are monitored and protected at seven Network parks (CAHA, CALO, CANA, CASA, CUIS, FOPU, and FOSU). These monitoring programs are currently coordinated with other state and federal agencies though not with one another. In addition to turtle monitoring, other related monitoring needs include predator, beach habitat, and light pollution monitoring.
- d. Feral Horses. Feral horses are present at CUIS, CALO, and CAHA. In addition to the need to monitor aspects of horse populations (i.e., demography, disease incidence rates), the effects of the horses on other park resources.

## Tables

**Table A9-1. Criteria for prioritizing monitoring objectives.**

Rank	Park Question	Examples	Examples (For T&E Species)
5	Mandated (for the Park). The park is <u>required</u> to meet specific monitoring objective as per legal or contractual obligations.	<ul style="list-style-type: none"> <li>Anything directly or explicitly mentioned in Park legislation or current / future management plans. Examples might include the size and impacts of horse populations at CUIS, water quality trends at CHAT, etc.</li> </ul>	<ul style="list-style-type: none"> <li>Monitoring red cockaded woodpeckers. If breeding pairs are present on the park, required under the recovery plan to conduct 100% census of population on an annual basis.</li> </ul>
4	Mission Critical. The Park <u>should</u> meet this objective to effectively manage its resources. Meeting this objective will provide information relevant to multiple resource issues.	<ul style="list-style-type: none"> <li>Success of NR Management, such as fire effects monitoring.</li> </ul>	<ul style="list-style-type: none"> <li>T&amp;E Species that are known to breed on NPS-managed lands, populations are in decline or critical, and Park has responsibility for managing those populations.</li> </ul>
3	Mission Support. Meeting the monitoring objective would provide information that would help the Park to better manage its resources, <u>but is not necessary</u> . Provides information that will influence one or more management decisions. Meeting this objective will provide information relevant to multiple resource issues.	<ul style="list-style-type: none"> <li>Trends in external / adjacent land use</li> <li>Trends and impacts of Air Quality (for some parks)</li> <li>Habitat fragmentation</li> </ul>	<ul style="list-style-type: none"> <li>T&amp;E Species that are known to exist within park boundaries. Documentation of changes to populations (or lack thereof) would influence management or policy decisions.</li> </ul>
2	Answering this question is of interest to the Park, but is not necessary for natural resource management. Effectively answering this question through a monitoring program might or might not shed light on multiple resource issues.	<ul style="list-style-type: none"> <li>Research</li> <li>Biological Inventories</li> <li>Protocol Development</li> </ul>	<ul style="list-style-type: none"> <li>Park is in range of species, but occurrence in Park is unknown or undocumented.</li> <li>Species known to migrate over, but not necessarily in park lands.</li> </ul>
1	Not the responsibility of the Park.	<ul style="list-style-type: none"> <li>Marine Fisheries at CAHA (perhaps).</li> </ul>	<ul style="list-style-type: none"> <li>N/A</li> </ul>
0	Not applicable to the Park.	<ul style="list-style-type: none"> <li>Estuarine processes at HOBE</li> </ul>	<ul style="list-style-type: none"> <li>Species range and park boundaries do not overlap.</li> </ul>

**Table A9-2. Purpose and participants of scoping meetings for prioritization of potential monitoring questions to be answered in the Southeast Coast Network Vital Signs Monitoring program.**

Meeting Date	Meeting Location / Parks Involved	Meeting Participants
06 February 2004	Timucuan Ecological & Historic Preserve Fort Caroline National Monument	Shauna Ray Allen, Resource Management Specialist
18 March 2004	Canaveral National Seashore	John Stiner, Chief of Resource Management
19 March 2004	Fort Matanzas National Monument Castillo de San Marcos National Monument	Gordon Wilson, Superintendent Dave Parker, Site Supervisor
09 April 2004	Horseshoe Bend National Military Park	Mark Lewis, Superintendent Roy Appugliese, Park Ranger (Protection)
04 May 2004	Chattahoochee River National Recreation Area	David Lairson, Biological Technician Nina Hemphill, Biologist Sara McCort, SCA Intern / SECN Data Technician Christina Wright, SECN Data Manager
07 May 2004	Congaree National Park	Martha Bogle, Superintendent Bill Hulslander, Integrated Resource Program Manager
21 May 2004	Ocmulgee National Monument	Jim David, Superintendent Guy Lachine, Chief Ranger
26 May 2004	Moore's Creek National Battlefield	Ann Childress, Superintendent Linda Brown, Park Ranger (Interpretation)
27 May 2004	Cape Lookout National Seashore	Michael Rikard, Chief of Resource Management
28 May 2004	Cape Hatteras National Seashore Wright Brothers National Memorial Fort Raleigh National Historic Site	Jim Ebert, Resource Management Specialist
09 June 2004	Fort Frederica National Monument	Denise Spear, Cultural Resource Specialist
09 June 2004	Cumberland Island National Seashore	John Fry, Chief of Resource Management
14 June 2004	Kennesaw Mountain National Military Park	Willie Johnson, Park Historian
16 June 2004	Fort Pulaski National Monument	John Breen, Superintendent Cliff Kevill, Park Ranger
17 June 2004	Fort Sumter National Monument Charles Pinckney National Historic Site	Sandy Pusey, Cultural Resource Program Manager



**Table A9-3. Monitoring Objectives dropped from consideration.**

Objective	Justification
Determine the status and trends of measurable airborne contaminants in lichens	Objective is indicator-based. None of the parks have priorities related to lichen management. However, indicators based on lichens were considered based on ability to achieve other monitoring objectives
Determine trends in plant phenology	Objective is indicator- rather than management-based. Although plant phenology can be an indicator of environmental conditions, none of the parks have any priorities related to managing phenology.
Determine the biological integrity of streams (inverts, fishes, and algae)	Combined scores with <i>Determine the status of biological water quality in streams and rivers</i>
Determine whether water quality is suitable to support swimming / public access	Will be treated as a "trigger point" in analysis of marine water quality data should marine water quality be analyzed in the final vital signs monitoring program. Scores were combined with the objective to <i>Determine the status and trends of contaminants in coastal waters</i> .
Determine whether ozone air quality standards are being met	Will be treated as a "trigger point" in analysis of air quality (ozone) data. Scores were combined with the objective to <i>Determine the status and trends of atmospheric ozone concentrations</i> .
Determine the extent to which the physical, chemical, and biological properties of soils vary spatially across varied landforms, parent materials, vegetative types, and watersheds	This will be accomplished during the soils inventory, which will be conducted at all network parks.
Determine the status, trends, and distribution of Australian Jellyfish populations	Scored 0 for all parks, indicating that it is not relevant to any park within the network.
Determine the status and trends of functional groups of terrestrial invertebrates	Combined with <i>Determine the status and trends of terrestrial invertebrate community structure, function, and composition</i> .
Determine the status and trends of physical water quality in streams and rivers	Combined with <i>Determine the spatial extent and quality of stream habitats</i>
Determine the relationship between non-point contaminants and land use	Research question not directly tied to resource management at the parks.
Determine the extent to which plants affect cultural resources	Analysis requires monitoring condition of cultural resources, which is outside the purview of the I&M program. Cultural resource managers have been identified as a key target audience for reporting plant distribution data.
Determine visitors' desires, expectations, and actual experiences in National Parks	Outside the purview of the Inventory & Monitoring program. Findings could be used to aid interpretation of I&M program data.
Determine the extent to which degraded water quality impacts cultural resources	Analysis requires monitoring condition of cultural resources, which is outside the purview of the I&M program. Cultural resource managers have been identified as a key target audience for reporting water quality data.
Determine the extent to which air quality affects park monuments, plaques, tablets, cannons, and other classified historic structures	Analysis requires monitoring condition of cultural resources, which is outside the purview of the I&M program. Cultural resource managers have been identified as a key target audience for reporting air quality data.
Determine the extent to which degraded water quality impacts visitor use.	Analysis requires monitoring condition of cultural resources, which is outside the purview of the I&M program. Public health advisory "trigger points" will be added to any relevant water quality vital signs, if implemented, to allow park managers to inform visitors of conditions.
Determine the extent to which exotic and other animals affect cultural landscapes / resources	Analysis requires monitoring condition of cultural resources, which is outside the purview of the I&M program. Cultural resource managers have been identified as a key target audience for reporting data from relevant animal population monitoring.
Determine the number and activities of Incidental Business Permit (IBP) users	Not a natural resource management objective. However, this might be a useful indicator for use in a protocol to <i>Determine the status and trends of the amount, type, and distribution of visitor uses</i> .
Determine the number and activities of special use permits	Not a natural resource management objective. However, this might be a useful indicator for use in a protocol to <i>Determine the status and trends of the amount, type, and distribution of visitor uses</i> .
Determine the number and activities of concessionaires	Not a natural resource management objective. However, this might be a useful indicator for use in a protocol to <i>Determine the status and trends of the amount, type, and distribution of visitor uses</i> .



			CAHA	CALO	CANA	CASA	CHAT	CONG	CUIS	FOFR	FOPU	FOSU	HOBE	KEMO	MOCR	OCMU	TIMU	Average	Adjusted Average
Category	Monitoring Objective																		
	Groundwater	Identify changes in the saltwater groundwater table over space and time	2	2	2	2	0	0	3	2	4	2	0	0	2	0	3	1.60	2.40
		Determine the status and trends of the amount of water in existing wells (discharge)	2	2	1	1	2	4	3	3	4	2	3	0	2	0	3	2.13	2.46
		Determine the status and trends of water storage levels in existing natural aquifers	2	2	2	2	0	2	3	2	4	2	2	2	2	2	3	2.13	2.29
		Identify changes in the freshwater groundwater table over space and time	3	2	2	2	2	4	3	2	4	2	2	2	2	2	3	2.47	2.47
		Determine the status and trends of groundwater quantity	3	2	2	2	2	4	3	3	4	2	2	3	2	2	3	2.60	2.60
		Determine the status and trends of groundwater quality	3	2	3	2	2	4	3	2	4	2	3	2	2	2	3	2.60	2.60
		Determine the status and trends of the quality of water in existing wells																	
	Air Resources	Ozone	2	2	3	3	4	3	3	2	2	2	2	3	2	3	3	2.60	2.60
		Particulates	2	2	2	2	0	2	3	2	3	2	2	3	2	3	2	2.13	2.29
		Toxics	2	2	2	2	2	3	3	3	3	2	3	3	2	2	2	2.40	2.40
			2	2	2	2	2	3	3	3	2	2	3	3	3	2	2	2.40	2.40
			2	2	3	3	2	3	3	3	2	2	2	3	3	2	2	2.47	2.47
			2	2	2	2	3	3	3	3	3	2	3	3	3	2	3	2.60	2.60
			2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2.00	2.00
Environmental Setting	Other	Determine the status and trends of the soundscape	2	3	3	4	2	4	4	2	3	2	3	3	3	4	0	2.80	3.00
		Determine the status and trends of light pollution	3	3	2	2	2	4	4	2	0	0	2	2	0	3	0	1.93	2.64
	Air Resources	Other	3	2	2	2	2	2	2	2	2	2	2	2	2	2	0	1.93	2.07
	Geologic Resources	Coastal Geology	3	4	4	3	0	0	4	0	4	4	0	0	0	0	4	2.00	3.75
		Determine the extent to which coastal shorelines change over space and time																	

			CAHA	CALO	CANA	CASA	CHAT	CONG	CUIS	FOFR	FOPU	FOSU	HOBE	KEMO	MOCR	OCMU	TINU	Average	Adjusted Average		
Category			Monitoring Objective																		
Geomorphology			Determine the status and trends of longshore sediment budgets	3	2	3	2	0	0	3	0	3	3	0	0	0	0	3	1.47	2.75	
			Determine the status and trends of sediment erosion and deposition in estuaries and lagoonal systems	2	2	2	2	0	0	2	2	2	2	2	0	0	0	0	4	1.33	2.22
			Determine the status and trends of riverbank stability	0	0	0	0	4	2	4	3	4	4	0	3	3	4	3	2	2.13	3.20
			Determine the status and trends of stream channel shape and size	2	0	0	0	4	3	2	3	0	0	3	3	4	3	3	2.00	3.00	
Soils			Determine the status and trends of sediment erosion and deposition in freshwater and tidal streams	2	2	3	4	4	2	4	2	2	2	2	3	4	4	4	2.93	2.93	
			Determine the status and trends of contaminants (biological & chemical) in stream channel and salt marsh sediments	2	2	2	3	2	3	4	3	3	3	2	2	2	2	4	3	2.60	2.60
			Determine the status and trends of contaminant concentrations in soils	3	2	2	2	2	3	4	2	2	3	2	2	2	2	2	2	2.33	2.33
Structural Geology			Determine the status and trends of soil fertility	3	2	2	2	2	2	3	2	2	2	3	2	2	2	0	2.07	2.21	
			Determine the status and trends of soil erosion	3	2	0	0	3	2	4	2	2	2	2	2	2	2	2	2	2.00	2.31
			Determine the magnitude and frequency of earthquakes	0	0	0	0	2	2	0	2	0	4	2	2	2	2	0	0	1.07	2.29
Weather and Climate General			Determine status and trends in precipitation	3	2	2	2	2	3	3	3	2	2	3	3	3	3	3	2.60	2.60	
			Determine status and trends in mean sea level	3	3	3	2	0	0	3	2	3	4	0	0	0	0	2	1.67	2.78	
			Determine the frequency and distribution of lightning strikes	3	2	4	2	2	2	3	2	2	2	2	3	2	3	2	2.40	2.40	
Environmental Setting			Determine status and trends in temperature	3	2	2	2	2	3	3	3	2	2	3	3	3	3	2	2.53	2.53	
			Determine the frequency of hurricanes, tropical storms, and other high-energy storm events	3	3	3	2	2	2	2	2	2	4	2	2	2	2	1	2.27	2.27	
			Determine the severity and frequency of droughts	3	2	2	2	3	2	3	3	2	2	3	2	2	2	3	2.40	2.40	
Park Resources	Species of Concern	Species	Determine the status, trends, and distribution of Georgia aster populations	0	0	0	0	4	0	0	0	0	0	2	0	0	0	0.40	3.00		
			Determine the status, trends, and distribution of alligator populations	2	2	3	0	0	2	3	2	3	2	0	0	0	2	3	1.60	2.40	
			Determine the status, trends, and distribution of Piping Plover populations																		

			CAHA	CALO	CANA	CASA	CHAT	CONG	CUIS	FOFR	FOPU	FOSU	HOBE	KEMO	MOCR	OCMU	TIMU	Average	Adjusted Average
Category	Monitoring Objective																		
		Determine the status, trends, and distribution of Seabeach Amaranth populations																	
		Determine the status, trends, and distribution of Diamondback Terrapin populations	3	3	4	3	0	0	3	2	3	2	0	0	0	0	3	1.73	2.89
		Determine the status, trends, and distribution of Sand Heather (Hudsonia tomentosa) populations	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.13	2.00
		Determine the status, trends, and distribution of marine turtle populations	4	5	5	4	0	0	5	0	3	2	0	0	0	0	0	1.87	4.00
		Determine the status, trends, and distribution of Atlantic sturgeon populations	2	0	2	0	0	3	1	2	3	2	0	0	2	2	2	1.40	2.10
		Determine the status, trends, and distribution of Grass of Parnassus (spelling?) populations	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0.13	2.00
		Determine the status, trends, and distribution of Carolina bog mint populations	0	0	0	0	0	3	0	0	0	0	0	0	4	0	0	0.47	3.50
		Determine the status, trends, and distribution of Bachman's Warbler populations	0	0	0	0	2	2	2	0	0	0	2	0	0	2	2	0.80	2.00
		Determine the status, trends, and distribution of Florida Scrub Jay populations	0	0	4	2	0	0	0	0	0	0	0	0	0	0	2	0.53	2.67
Park Resources	Species of Concern	Species																	
		Determine the status, trends, and distribution of Red Cockaded Woodpecker populations	0	0	2	0	0	2	2	2	0	2	2	0	3	0	0	1.00	2.14
		Determine the status, trends, and distribution of Bald Eagle populations	2	2	2	2	3	3	1	2	2	2	0	2	0	2	3	1.87	2.15
		Determine the status, trends, and distribution of Least Tern populations	4	3	3	4	0	0	3	0	2	0	0	0	0	0	2	1.40	3.00
		Determine the status, trends, and distribution of Eastern Indigo Snake populations	0	0	4	4	0	0	0	0	0	0	2	0	0	0	4	0.93	3.50
		Determine the status, trends, and distribution of Atlantic Salt marsh snake populations	0	0	4	2	0	0	0	0	0	0	0	0	0	0	0	0.40	3.00
		Determine the status, trends, and distribution of sensitive joint vetch populations	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.13	2.00
		Determine the status, trends, and distribution of Atlantic and Southeastern Beach Mouse populations	0	0	4	4	0	0	0	0	0	0	0	0	0	0	0	0.53	4.00
		Determine the status, trends, and distribution of Wood Stork populations	0	0	3	3	0	3	3	2	2	0	0	0	0	2	4	1.47	2.75

			CAHA	CALO	CANA	CASA	CHAT	CONG	CUIS	FOFR	FOPU	FOSU	HOBE	KEMO	MOCR	OCMU	TIMU	Average	Adjusted Average
Category			Monitoring Objective																
Park Resources	Exotics Invasives Nuisance and Others	Plants	Determine the status, trends, and distribution of Gopher tortoise populations	0	0	4	4	0	0	4	0	0	0	0	0	0	4	1.07	4.00
			Determine the status, trends, and distribution of Manatee populations	2	0	4	2	0	0	1	2	3	2	0	0	0	4	1.33	2.50
			Determine the status, trends, and distribution of Painted Bunting populations	0	2	3	4	2	2	2	2	3	2	2	0	2	3	2.07	2.38
		Vertebrates	Determine the status, trends, and distribution of exotic plant populations	3	3	4	4	4	4	3	3	2	3	4	4	4	4	3.53	3.53
			Determine the extent to which the geographical / ecological ranges of armadillos, red foxes, and beavers are changing	4	3	2	2	2	3	2	3	2	3	2	2	2	2	2.40	2.40
			Determine the status, trends, and distribution of non-native bird populations	2	2	2	2	2	2	2	3	2	2	2	2	2	2	2.07	2.07
			Determine the status, trends, and distribution of raccoon populations	4	3	4	2	2	2	2	3	2	2	2	3	2	2	2.47	2.47
		Vertebrates	Determine the status, trends, and distribution of deer populations	2	0	2	2	2	3	3	3	2	3	3	2	3	0	2.13	2.46
			Determine the status, trends, and distribution of feral hog populations	2	0	4	2	0	4	4	2	0	0	0	0	4	4	1.73	3.25
			Determine the status, trends, and distribution of feral dog populations	2	0	2	2	2	0	2	0	0	2	2	0	2	2	1.33	2.00
			Determine the status, trends, and distribution of feral horses	3	4	0	0	0	4	0	0	0	0	0	0	0	0	0.73	3.67
			Determine the status, trends, and distribution of feral cat populations	4	3	3	3	2	2	2	2	2	2	2	2	2	2	2.33	2.33
		Invertebrates	Determine the status, trends, and distribution of nonnative mammal populations	3	0	2	2	3	4	2	2	2	2	2	2	2	2	2.13	2.29
			Determine the magnitude, frequency, and extent of outbreaks of destructive insects	2	3	2	2	3	3	2	3	3	2	3	4	2	2	2.53	2.53
			Determine the status, trends, and distribution of exotic mussels	0	0	3	3	2	3	3	2	2	2	2	2	2	0	1.87	2.33
			Determine the status, trends, and distribution of nuisance / pest insect species (i.e., mosquitoes, ticks, fire ants)	4	0	2	2	2	3	3	3	3	3	3	2	4	2	2.60	2.79
	Communities	Fish	Determine the status and trends of fish health	2	3	3	2	2	3	2	2	2	2	2	2	2	4	2.33	2.33

		CAHA	CALO	CANA	CASA	CHAT	CONG	CUIS	FOFR	FOPU	FOSU	HOBE	KEMO	MOCR	OCMU	TIMU	Average	Adjusted Average
Category	Monitoring Objective																	
	Determine the status and trends of native resident fish populations (as opposed to migratory or non-native fishes)	2	3	4	2	3	3	2	2	2	2	2	2	2	2	3	2.40	2.40
	Determine the status and trends of seasonal habitat use by anadromous fish species	2	3	2	2	2	2	2	2	2	2	0	0	2	2	2	1.80	2.08
	Determine the status and trends of fish community structure, function, and composition	2	2	3	2	3	3	3	2	3	2	2	2	2	2	4	2.47	2.47
	Invertebrates Determine the status and trends of marine / estuarine invertebrate community structure, function, and composition	2	2	2	2	0	0	2	0	3	2	0	0	0	0	0	1.00	2.14
Park Resources Communities	Invertebrates Determine the status and trends of intertidal invertebrate community structure, function, and composition	2	2	3	2	0	0	3	2	2	2	0	0	0	0	4	1.47	2.44
	Determine the status and trends of terrestrial invertebrate community structure, function, and composition	3	2	2	2	2	2	3	2	2	2	2	2	2	3	4	2.33	2.33
	Determine the status and trends of lake / pond invertebrate community structure, function, and composition	2	2	2	2	2	2	2	0	2	0	2	0	0	2	2	1.47	2.00
	Determine the status and trends of freshwater invertebrate community structure, function, and composition	2	2	3	2	3	3	3	0	2	2	2	2	2	2	2	2.13	2.29
	Plants Determine the status and trends of maritime forest community structure, function, and composition	3	3	2	2	0	0	4	2	2	2	0	0	0	0	3	1.53	2.56
	Determine the status, trends, and distribution of state and federally listed rare plants or other species of local concern	3	4	3	2	3	4	2	2	2	2	2	2	4	3	3	2.73	2.73
	Assess changes in the status and health of heritage / champion trees	0	0	0	0	0	3	2	0	0	0	2	0	0	0	0	0.47	2.33
	Determine the status and trends of plant community structure, function, and composition	2	2	2	2	3	4	4	2	2	2	4	2	2	2	4	2.60	2.60
	Determine the status and trends of inland/upland forest plant community structure, function, and composition	2	2	2	2	3	4	4	2	2	2	4	3	2	3	2	2.60	2.60
	Determine the status and trends of shell midden plant community structure, function, and composition	2	2	4	0	0	0	2	0	0	0	0	0	0	0	3	0.87	2.60

			CAHA	CALO	CANA	CASA	CHAT	CONG	CUIS	FOFR	FOPU	FOSU	HOBE	KEMO	MOCR	OCMU	TIMU	Average	Adjusted Average
Category	Monitoring Objective																		
		Determine the status, trends, and distribution of salt marsh grass species (Juncus and Spartina spp.)	3	2	2	2	0	0	4	2	3	2	0	0	0	0	4	1.60	2.67
		Determine the status, trends, and distribution of rare plant species	3	3	2	2	3	4	3	2	2	2	3	2	4	3	2	2.67	2.67
		Determine the status, trends, and distribution of sea grass populations in intertidal and subtidal (nearshore) habitats	2	3	4	0	0	0	0	0	0	2	0	0	0	0	0	0.73	2.75
Park Resources	Communities	Plants	Determine the status and trends of coastal dune plant community structure, function, and composition	4	2	3	3	0	0	4	0	0	0	0	0	0	2	1.20	3.00
		Mammals	Determine the status and trends of small mammal community structure, function, and composition	2	2	3	3	3	3	2	2	2	3	2	2	2	3	2.47	2.47
			Determine the status and trends of bat community structure, function, and composition	2	2	2	2	2	3	2	2	2	2	2	2	2	2	2.07	2.07
		Herps	Determine the status and trends of reptile and amphibian community structure, function, and composition	2	3	3	3	3	4	2	2	2	3	2	2	2	4	2.67	2.67
			Determine the status and trends of populations of aquatic breeding amphibians	2	2	2	2	2	3	2	2	2	3	2	2	2	3	2.20	2.20
			Determine the status and trends of amphibian health	2	2	2	2	2	3	2	2	2	2	2	2	2	2	2.07	2.07
			Determine the incidence and prevalence of Gopher Tortoise upper respiratory disease	0	0	4	4	0	0	3	0	0	0	2	0	0	2	1.20	3.00
		Birds	Determine the status, trends, and distribution of nesting diurnal raptor populations	2	2	2	2	3	3	2	3	2	2	3	2	2	3	2.33	2.33
			Determine the status, trends, and distributions of populations of migratory birds (neotropical and shorebirds)	4	3	3	3	2	4	4	2	2	2	3	2	2	4	2.80	2.80
			Determine the status, trends, and distributions of populations of common bird species	2	2	2	2	3	4	2	2	2	2	3	2	2	2	2.27	2.27
			Determine the status, trends, and diversity of breeding bird populations	4	3	3	3	4	4	2	3	2	2	3	2	2	3	2.87	2.87
			Determine the status, trends, and distribution of rare and listed bird species	4	4	3	4	2	4	4	2	2	2	4	3	3	3	3.07	3.07
			Determine the status and trends of landbird community structure, function, and composition	2	2	2	2	3	3	2	2	2	3	3	2	2	4	2.40	2.40



			CAHA	CALO	CANA	CASA	CHAT	CONG	CUIS	FOFR	FOPU	FOSU	HOBE	KEMO	MOCR	OCMU	TIMU	Average	Adjusted Average	
Category			Monitoring Objective																	
Park Resources	Communities	Non-Vascular Plans & Fungi	Determine the status, trends, and diversity of wading / shorebird populations	4	3	4	4	3	2	4	2	3	2	3	2	0	4	2.80	3.00	
			Determine the status, trends, of fungal community structure, function, and composition	2	2	2	2	2	3	2	2	2	2	2	2	2	2	2	2.07	2.07
			Determine the status, trends, and distribution of lichen and moss populations	2	2	2	2	2	3	2	2	2	2	2	2	2	2	2	2.07	2.07
Habitats & Systems	Beaches & Dunes	Determine the status and trends of shells on beaches.	2	2	0	0	0	0	2	0	0	0	0	0	0	0	2	0.53	2.00	
		Determine the grainsize distribution, content, color, and mineral composition of sand on beaches.	4	2	2	2	0	0	3	0	0	0	0	0	0	0	0	0.87	2.60	
		Determine the status and trends of the amount of large woody debris on beaches	2	2	0	0	0	0	2	0	0	0	0	0	0	0	0	0.40	2.00	
			Determine the status, trends, and quality of wrack on beaches	4	2	2	2	0	0	3	0	0	0	0	0	0	0	0.87	2.60	
			Determine the spatial extent and inundation frequency of seasonally intermittent pools.	3	2	0	0	2	2	4	0	0	0	2	0	2	3	0	1.33	2.50
			Determine the spatial extent, distribution, and diversity of wetlands and wetland habitats	4	3	3	3	4	3	4	3	3	2	2	3	3	3	4	3.13	3.13
	Rivers, Streams & Lakes	Determine the spatial extent and quality of lake and pond habitats	3	2	2	2	2	4	4	0	3	0	3	0	0	4	0	1.93	2.90	
		Determine the spatial extent and quality of habitat in the littoral zone and the terrestrial shoreline in lakes and ponds.	2	0	0	0	4	2	3	0	0	2	2	0	0	2	3	1.33	2.50	
		Determine the spatial extent and quality of stream habitats. Includes tidal streams.	3	0	2	0	4	4	3	2	2	0	4	3	3	3	4	2.47	3.08	
	Estuaries	Determine the status, trends, density and distribution of woody debris in streams.	2	0	0	0	2	2	2	2	0	2	2	2	2	2	0	1.33	2.00	
		Determine the spatial extent and quality of habitat in the littoral zone and the terrestrial shoreline in lagoonal / estuarine systems	3	2	2	2	0	0	4	0	2	2	0	0	0	0	4	1.40	2.63	
		Determine the status, trends, distribution and use of fish spawning & nursery habitats	2	3	4	2	0	0	3	0	2	2	0	0	0	0	4	1.47	2.75	
	Terrestrial System	Determine the spatial extent and quality of intertidal habitats	3	2	2	2	0	0	3	0	3	2	0	0	0	0	3	1.33	2.50	
		Determine the status and trends of bird habitat quality and quantity	4	3	3	4	2	4	4	2	2	2	2	4	3	3	4	3.07	3.07	

				CAHA	CALO	CANA	CASA	CHAT	CONG	CUIS	FOFR	FOPU	FOSU	HOBE	KEMO	MOCR	OCMU	TIMU	Average	Adjusted Average
Category		Monitoring Objective																		
Park Resources	Habitats & Systems	Terrestrial System	Determine the status and trends of forest structure.	2	2	2	2	2	4	4	2	2	2	4	3	2	3	4	2.67	2.67
		Marine Systems	Determine the status and trends of subtidal community structure, function, and composition	3	2	2	0	0	0	3	0	0	2	0	0	0	0	1	0.87	2.17
			Determine the status and trends of intertidal community structure, function, and composition (i.e., invertebrates, macroalgae, intertidal fish, hardshell clams...)	4	3	4	3	0	0	4	2	3	2	0	0	0	0	4	1.93	3.22
		General	Determine status and trends in land use or land cover types within Park boundaries.	3	2	2	2	2	2	2	2	2	2	4	3	2	3	4	2.47	2.47
Ecosystem Function	Energy / Material Flow		Determine the status and trends of nutrient cycling in riverine ecosystems.	2	2	0	0	2	2	2	2	2	2	2	2	2	2	2	1.73	2.00
			Determine the status and trends of detrital loads from riparian zones into riverine ecosystems.	2	2	0	0	2	2	2	2	2	2	2	2	2	2	2	1.73	2.00
			Determine the status and trends of ecosystem functions in wetlands.	3	2	2	0	2	2	3	2	3	2	2	2	3	3	3	2.27	2.43
	Trophic & Functional Guilds		Determine the status and trends of carbon cycling in riverine ecosystems.																	
			Determine the status and trends of pollinators within the Park.	2	2	2	2	2	3	2	2	2	2	2	2	2	2	2	2.07	2.07
			Determine the status and trends of natural predators.	3	3	3	2	2	2	4	2	2	2	2	2	2	2	2	2.33	2.33
			Determine the extent to which (over) browsing pressure affects plant communities	3	3	2	2	2	2	4	2	3	2	2	2	2	3	0	2.27	2.43
			Determine the status and trends of the prey base for large carnivores.	3	2	2	2	2	2	2	2	2	2	3	2	2	2	0	2.00	2.14
			Determine the status and trends of large carnivores (bobcat or bigger).	2	2	2	2	2	2	4	0	2	2	3	2	2	3	0	2.00	2.31
	Disease		Determine the extent to which wildlife diseases (inside and outside park boundaries) affect animal populations	3	2	2	2	2	2	3	2	3	2	3	2	2	2	2	2.27	2.27
			Determine the incidence and prevalence of wildlife diseases to which humans are at risk	3	2	2	2	2	2	3	2	3	2	3	2	2	2	3	2.33	2.33
Park Resources	Ecosystem Function	Disease	Determine the incidence and prevalence of wildlife diseases to which animal populations are at risk																	

			CAHA	CALO	CANA	CASA	CHAT	CONG	CUIS	FOFR	FOPU	FOSU	HOBE	KEMO	MOCR	OCMU	TIMU	Average	Adjusted Average	
Category			Monitoring Objective																	
Agents of Change	Park Resource Management	Maintenance / Trail Management	Determine the extent to which “down and dead” clearing activities affect animal populations dependent upon forest litter	2	0	2	2	2	0	2	2	0	2	2	2	2	3	2	1.67	2.08
			Determine the extent to which mechanical removal of hazard trees affects natural ecosystem processes.	3	0	2	2	2	2	2	3	0	2	2	3	2	3	3	2.07	2.38
			Determine the extent to which park management actions affect sensitive plant communities (trail clearing, vegetation trimming, boardwalk construction).	3	2	2	2	2	2	2	2	0	2	2	2	2	3	2	2.00	2.14
			Determine the extent to which “down and dead” clearing activities affect natural ecosystem processes	2	0	2	2	2	0	2	2	0	2	2	2	2	3	2	1.67	2.08
		Exotic Plant Management	Determine the extent to which exotic plant management affects populations of exotic species.	3	3	4	4	4	3	4	3	3	3	4	4	4	4	3	3.53	3.53
			Determine the extent to which exotic plants affect Park resources.	3	2	3	3	3	4	2	2	3	3	4	3	4	4	2	3.00	3.00
			Determine the extent to which plants affect cultural resources.	3	2	2	4	3	2	2	2	3	3	3	2	4	4	4	2.87	2.87
		Fire Management	Determine the status and trends of understory composition in areas of (historically) natural fire.																	
			Determine the status and trends of fuel loads in areas of (historically) natural fire.																	
			Determine the extent to which fire management affects wildlife																	
			Determine the status and trends of acreage of wildland-urban interface																	
			Determine the extent to which fire suppression, reintroduction, etc. affect status and trends of fire-adapted communities	3	0	3	3	3	3	4	3	0	2	4	2	2	2	4	2.53	2.92
			Determine the extent to which mechanical fuel reduction mimics natural ecosystem processes.	2	2	3	0	2	2	2	3	2	0	4	2	2	2	4	2.13	2.46
			Determine the extent to which prescribed burning (or lack thereof) affects plant populations?	2	2	3	0	3	4	4	3	2	0	4	2	4	2	0	2.33	2.92

			CAHA	CALO	CANA	CASA	CHAT	CONG	CUIS	FOFR	FOPU	FOSU	HOBE	KEMO	MOCR	OCMU	TIMU	Average	Adjusted Average	
Category			Monitoring Objective																	
			Determine the extent to which fire management affects wildlife habitats																	
			Determine the status and trends of tree densities, understory composition, and fuel loads in areas of (historically) natural fire.																	
	Restoration		Determine the extent to which restoration efforts improve the distribution of longleaf / flatwoods pine forest communities	0	0	0	0	0	3	0	0	0	0	4	2	4	0	4	1.13	3.40
			Determine the extent to which the removal of water control / blockage structures improve wetland hydroperiod and hydropattern	2	0	3	0	4	2	2	0	0	0	0	0	4	0	0	1.13	2.83
			Determine the extent to which restoration efforts improve the distribution of scrub communities																	
	Disturbance (Anthropogenic)	Land Use & Development	Determine the extent to which land use / land cover affects sensitive species within the park.	4	2	3	3	3	2	4	2	3	2	2	2	3	3	3	2.67	2.67
			Determine the extent to which land use / land cover affects the delivery of contaminants to streams and estuaries.																	
			Determine the extent to which land use / land cover affects the delivery of large woody debris into streams and estuaries.																	
			Determine the extent to which land use / land cover affects the delivery of sediments into streams estuaries	2	0	0	0	4	3	4	2	2	2	2	3	2	3	4	2.20	2.75
			Determine the extent to which land use / land cover affects hydrology.																	
			Determine the extent to which roads throughout and surrounding the Park affect animal communities within the Park.																	
			Determine the extent to which roads throughout and surrounding the Park affect water quality within the Park.																	
Agents of Change	Disturbance (Anthropogenic)	Land Use & Development	Determine the status and trends of habitat fragmentation within the landscape (of which the park is a part)	2	2	2	2	3	2	2	2	2	2	3	2	3	2	2	2.20	2.20
			Determine the extent to which roads throughout and surrounding the Park affect water flow within the Park.	2	0	2	2	2	3	4	2	4	2	2	2	3	2	2	2.27	2.43

			CAHA	CALO	CANA	CASA	CHAT	CONG	CUIS	FOFR	FOPU	FOSU	HOBE	KEMO	MOCR	OCMU	TIMU	Average	Adjusted Average	
Category			Monitoring Objective																	
			Determine the location and distribution of culverts and other flow restrictions within and surrounding the park.	2	0	3	0	3	2	4	2	2	2	2	2	4	4	2.27	2.62	
			Determine the status and trends of road density within and surrounding the park.	2	0	2	2	3	2	2	2	4	2	2	3	2	4	3	2.33	2.50
			Determine the status and trends of adjacent land use.	3	2	2	2	3	3	4	2	3	2	3	3	3	3	4	2.80	2.80
			Determine the extent to which land use / land cover affects streams and estuarine ecosystems	2	2	2	2	3	3	2	2	2	2	2	3	3	4	4	2.53	2.53
			Determine the extent to which changes in land use / land cover affect freshwater resources.	2	3	0	0	3	3	2	2	2	2	4	3	3	2	0	2.07	2.58
			Determine the extent to which the pattern of land use or land cover types affect Park resources	3	2	2	2	3	2	3	2	2	2	3	3	3	3	2	2.47	2.47
			Determine the extent to which roads throughout and surrounding the Park affect plant communities within the Park.																	
Water Resource Management			Determine the extent to which large impoundments and water diversion structures affect water resources within Park boundaries.	4	0	3	0	4	4	0	2	3	0	4	0	2	2	0	1.87	3.11
			Determine the extent to which beavers affect natural hydrology.	0	0	0	0	3	2	0	0	0	0	3	3	4	3	0	1.20	3.00
			Determine the extent to which water control structures and other flow restrictions affect water resources.	4	0	3	0	0	2	4	0	4	0	0	0	0	4	0	1.40	3.50
			Determine the extent to which regional or adjacent stormwater management affects Park resources.	2	2	2	2	4	3	2	2	2	2	2	2	3	4	3	2.47	2.47
Agents of Change	Disturbance (Anthropogenic)	Coastal Zone Management	Determine the extent to which jetties affect sediment transport budgets.	4	2	3	0	0	0	4	0	3	3	0	0	0	0	3	1.47	3.14
			Determine the extent to which shoreline erosion control structures (revetments) affect erosion rates.	4	0	3	0	2	2	0	3	4	3	0	0	3	0	4	1.87	3.11
			Determine the extent to which docks, piers, bulkheads and other shoreline stabilization structures affect water flow and coastal geomorphology.	4	3	2	2	4	2	2	2	4	2	0	0	2	0	4	2.20	2.75

			CAHA	CALO	CANA	CASA	CHAT	CONG	CUIS	FOFR	FOPU	FOSU	HOBE	KEMO	MOCR	OCMU	TIMU	Average	Adjusted Average	
Category			Monitoring Objective																	
Agents of Change	Disturbance (Anthropogenic)	Other External Resource Management	Determine the extent to which beach re-nourishment projects affects coastal geomorphology	4	2	2	2	0	0	4	0	0	2	0	0	0	0	2	1.20	2.57
			Determine the extent to which external hunting pressure affects hog populations within the Park.																	
			Determine the extent to which external hunting pressure affects dog populations within the Park.																	
			Determine the extent to which external hunting pressure affects turkey populations within the Park																	
			Determine the extent to which external hunting pressure affects animal populations within Park boundaries.	2	2	2	2	0	3	0	2	2	0	3	2	2	0	2	1.60	2.18
	Visitor Use	Determine the extent to which external hunting pressure affects deer populations within the Park.	0	0	2	2	0	0	0	0	0	0	2	0	2	0	0	0.53	2.00	
		Determine the extent to which external hunting pressure affects waterfowl populations within the park																		
		Determine the extent to which human-animal interactions affect animal behavior, distribution, and abundance of animal populations.	4	3	4	4	2	2	2	0	2	2	2	2	2	2	3	2.40	2.57	
		Determine the extent to which horseback riding on trails affects natural resources.	2	0	2	0	2	0	0	0	0	0	2	3	0	0	0	0.73	2.20	
		Determine the extent to which the use of personal watercrafts, canoes, or other boat affects natural resources.	2	3	4	0	2	0	4	2	2	2	2	0	2	0	2	1.80	2.45	
		Determine the extent to which boating activity affects submerged aquatic vegetation beds & associated communities	2	3	4	0	0	0	0	0	0	0	0	0	0	0	2	0.73	2.75	
		Determine the extent to which visitor uses of natural areas affect animal behavior, distribution, and abundance of animal populations	4	4	4	4	2	2	2	2	2	2	2	2	2	2	2	2.53	2.53	
		Determine the extent to which visitor use affects backcountry / Wilderness areas	2	3	0	0	0	2	2	0	0	0	2	0	0	0	2	0.87	2.17	

			CAHA	CALO	CANA	CASA	CHAT	CONG	CUIS	FOFR	FOPU	FOSU	HOBE	KEMO	MOCR	OCMU	TIMU	Average	Adjusted Average
Category			Monitoring Objective																
			Determine the extent to which visitors affect native vegetation.																
			Determine the extent to which visitor uses affect surficial hydrology																
			Determine the extent to which visitors affect natural resources.																
			Determine the status and trends of the amount, type, and distribution of visitor uses																
			Determine the number, distribution, and extent of human-impacted sites (incl. trails, campsites, boat launches...).																
			Determine the extent to which human-induced disturbances and modifications affect soils																
			Determine the magnitude and extent of erosion in areas of high recreation use																
			Determine the extent to which off-road vehicle use affects natural resources.																
			Determine the extent to which visitor-induced disturbances affect freshwater resources																
		Resource Extraction	Determine the extent to which surface water extraction affects Park resources.																
			Determine the frequency and intensity of sand dredging.																
Agents of Change	Disturbance (Anthropogenic)	Resource Extraction	Determine the extent to which illegal harvesting affects populations of commercially valuable plant species (i.e., ginseng, goldenseal, bloodroot).																
			Determine the extent to which native vegetation is harvested																
			Determine the extent to which groundwater extraction affects wetlands.																
			Determine levels of commercial and recreational and fishery pressure																
			Determine the extent to which scientific collection and poaching affects sensitive plant populations																
			Determine the extent to which channel dredging affects hydrology.																

			CAHA	CALO	CANA	CASA	CHAT	CONG	CUIS	FOFR	FOPU	FOSU	HOBE	KEMO	MOCR	OCMU	TIMU	Average	Adjusted Average
Category			Monitoring Objective																
Agents of Change	Disturbance (Anthropogenic)	Resource Extraction	Determine the extent to which groundwater extraction affects riparian / salt marsh habitat																
			3	3	2	2	3	2	4	0	4	3	2	0	0	0	4	2.13	2.91
			Determine the extent to which channel dredging affects natural ecosystems.																
			2	0	0	0	3	0	2	0	0	0	2	0	0	0	2	0.73	2.20
			Determine the extent to which sand mining affects natural systems.																
			3	3	2	2	2	4	3	2	3	2	2	0	0	2	3	2.20	2.54
			Determine the extent to which commercial and recreational shellfish harvesting affect park aquatic habitats.																
			2	3	4	2	0	0	3	3	3	0	0	0	0	0	4	1.60	3.00
			Determine the extent to which groundwater extraction affects surface water quantity																
			2	3	4	2	0	2	3	3	3	2	2	0	2	2	4	2.27	2.62
			Determine the extent to which finfishing and shellfishing within park boundaries affect native populations																
			2	2	3	3	0	0	3	0	3	2	0	0	2	2	3	1.67	2.50
			Determine the extent to which off-shore and adjacent fishing pressures affect park resources																
			2	2	2	2	2	4	3	2	3	2	3	2	2	2	2	2.33	2.33
			Determine the extent to which groundwater extraction affects riparian / salt marsh wildlife																
Agents of Change	Disturbance (Anthropogenic)	Resource Extraction	3	3	0	0	4	4	2	2	3	2	4	0	2	2	0	2.07	2.82
			Determine the extent to which regional water withdrawal and impoundment affect local water quantity.																
		Contaminants Exposure	2	3	2	0	2	2	3	0	2	0	3	0	0	0	2	1.40	2.33
			Determine the extent to which hunting pressure within the park boundaries (permitted and poaching) affects animal populations																
			Determine the extent to which changes in groundwater quality affect riparian / salt marsh wildlife																
			Determine the extent to which bioaccumulation and biomagnification affect visitor experience.																
			Determine the extent to which changes in groundwater quality affect riparian / salt marsh habitat																
			3	2	2	2	2	3	2	2	3	2	2	2	2	3	2	2.27	2.27
			Determine the extent to which bioaccumulation and biomagnification affect park resources.																



			CAHA	CALO	CANA	CASA	CHAT	CONG	CUIS	FOFR	FOPU	FOSU	HOBE	KEMO	MOCR	OCMU	TIMU	Average	Adjusted Average			
Category			Monitoring Objective																			
Agents of Change	Disturbance (Natural)	Disturbance / Recovery	Determine the extent to which atmospheric deposition of contaminants affects water resources.	2	2	2	2	2	3	2	2	2	2	2	2	2	2	0	1.93	2.07		
			Determine the extent to which air quality affects soil resources	2	2	2	2	2	3	2	2	2	2	2	2	2	2	2	2	2.07	2.07	
			Determine the level of risk for eutrophication due to water quality degradation	3	2	2	2	0	0	2	2	3	0	0	0	0	0	0	2	1.20	2.25	
			Determine the extent to which air chemistry affects freshwater (lake and pond) resources	2	2	0	0	2	2	3	0	2	0	2	0	0	0	2	2	1.27	2.11	
			Determine the extent to which degraded water quality impacts natural resources	3	0	0	0	2	4	3	0	0	0	4	2	3	4	3	3	1.87	3.11	
			Determine the incidence and severity of ozone injury within plant communities	2	2	2	2	2	3	2	2	2	2	2	3	2	3	2	2	2.20	2.20	
	Disturbance (Natural)	Disturbance / Recovery	Determine the status and trends of early successional species in parks.	2	2	0	0	2	3	3	2	2	2	3	2	2	2	3	3	2.00	2.31	
			Determine the extent to which geomorphic chages affect flow and sediment transport	2	0	0	0	4	2	2	2	2	2	3	3	3	4	3	3	2.13	2.67	
			Determine the extent to which geomorphic changes affect riparian vegetation.	2	0	0	0	4	2	2	2	0	0	3	3	3	2	0	0	1.53	2.56	
			Determine the magnitude, frequency, and extent of high tide events (storm surges, seasonal changes).	3	2	3	3	0	0	4	2	2	2	0	0	0	0	4	4	1.67	2.78	
			Determine the magnitude, frequency, and extent of flooding events	2	2	0	0	2	4	2	2	2	2	3	2	3	3	2	2	2.07	2.38	
			Determine the status and trends of flow dynamics (hydroperiod, quantity, peak flows) of aquatic systems including rivers, lakes and ponds, wetlands, and estuaries, and ditches.	2	2	2	2	4	4	3	2	2	2	2	2	3	3	4	4	2.60	2.60	
			Determine the incidence, and severity, and distribution of mortality, disease, and insect pests (native and non-native) in forest communities	2	2	2	2	3	3	3	3	3	2	2	4	4	2	2	2	2.53	2.53	
			Determine the extent to which earthquakes affect park resources	0	0	0	0	2	2	0	2	0	3	2	2	2	0	0	0	1.00	2.14	
			Species Invasions	Determine the magnitude and extent of hog-induced habitat degradation	2	0	4	2	0	4	2	0	0	0	0	0	0	0	4	3	1.40	3.00
			Determine the extent to which exotic fishes affect native fish communities	2	2	2	2	3	2	2	2	2	2	2	2	2	2	2	3	2.13	2.13	

			CAHA	CALO	CANA	CASA	CHAT	CONG	CUIS	FOFR	FOPU	FOSU	HOBE	KEMO	MOCR	OCMU	TIMU	Average	Adjusted Average	
Category			Monitoring Objective																	
Agents of Change	Disturbance (Natural)	Changing Habitats	Determine the extent to which exotic and other animals affect cultural landscapes / resources	2	2	3	2	0	4	4	2	3	2	3	0	0	4	4	2.33	2.92
			Determine the extent to which rooting pressure from feral hogs affects plant community structure, function, and composition.	3	0	4	2	0	4	3	0	0	0	0	0	0	2	4	1.47	3.14
			Determine the extent to which exotic aquatic plants affect native plant and animal communities	0	2	2	2	3	2	4	2	0	0	2	2	2	2	4	1.93	2.42
			Determine the extent to which changes in habitat quality / availability affect breeding land birds and shore birds	4	2	2	2	3	3	4	2	2	3	3	3	2	2	2	2.60	2.60
			Determine the extent to which changes in coastal dune habitats affect dependent plant and animal communities	4	2	4	4	0	0	4	0	0	0	0	0	0	0	0	1.20	3.60
		Climate Change	Determine the extent to which hurricanes, tropical storms, and other high-energy storm events affect coastal geomorphology																	
			Determine the extent to which changes in sea level affect park resources	3	3	2	2	0	2	3	2	3	4	0	0	2	0	3	1.93	2.64
			Determine the extent to which global warming affects park resources	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2.00	2.00
			Determine the extent to which climate change affects species composition and distribution within subtidal habitats.	3	2	2	0	0	0	2	0	0	2	0	0	0	0	1	0.80	2.00

**Table A9-5. Park Notes about score justifications from scoping meetings. Questions highlighted in green indicate those where adjusted averages were greater than 3.**

Category			Monitoring Objective	Park	Notes	
Environmental Setting	Water Resources	Freshwater Streams & Rivers	Determine the status and trends of biological water quality in streams and rivers	CHAT	Sewage-related issues are a huge issue for the park. Tied to both the enabling legislation and GMP.	
				CONG	water resource management plan calls for maintaining biological integrity of WR.	
				FOFR	Brackish system.	
				FOPU	Only stream here is oyster creek, which isn't freshwater.	
				CUIS	Potential impacts from horse populations	
				Determine the status and trends of chemical water quality in streams and rivers	KEMO	lots of development; chemical plant upstream. Other urban effects. Might need to be upgraded to 4.
					MOCR	salinity important, particularly during storm events.
					OCMU	Same reason as above
					FOFR	brackish
					CHAT	sewage-related issues are a huge issue for the park
	Determine the status and trends of water quantity in streams and rivers	CHAT	related to tri-state issues			
		CAHA	copule creeks (freshwater) on okracoke. Some tidal creeks, too.			
	OCMU	have an issue with water level;				
	MOCR	Water quantity is heavily influenced by tides. Water level changes 2-3 feet per day with tides.				
	KEMO	two creeks on site. Get out of their banks, but no extended flooding.				
	HOBE	dam proposal upstream.				
	Freshwater Ponds & Lakes	Determine the status and trends of water quantity in lakes and ponds.	CUIS	many spp. Dependent on habitat. Necessary for wood stork nesting / management		
			CHAT	not considering bull sluice lake as part of the lake system (included with rivers)		
			FOPU	if they go down, habitat gets lost for alligators and fish. Also won't be serving their purpose without water.		
			Marine	Determine the distribution, frequency, type, and sources of marine debris	FOPU	Savannah state did a study on marine debris for the county that occurred two sites on the park. Sources primarily from boating and shipping (offshore)
	FOSU	~200 acres near Fort Sumter. Park doesn't have any beach property.				
	CASA	military waste can be a problem sometimes.				
Environmental Setting	Water Resources	Marine			Determine the distribution, frequency, type, and sources of marine debris	CALO

Category			Monitoring Objective	Park	Notes
Environmental Setting	Water Resources	Estuarine / Tidal Marsh	Determine the extent to which marine waters are at risk of harmful algal blooms.	CANA	medical waste, hazardous materials, plastics. Detrimental to both humans and wildlife.
				CUIS	no marine debris monitoring happening at this time
				TIMU	An issue in the estuarine side, but not on beaches because not in jurisdiction.
				CUIS	none have been recorded here.
				CALO	Haven't had any that we know of yet, but Pfiesteria is a potential issue. Potentially after hurricanes?
			Determine the status and trends of contaminants in coastal waters.	CAHA	includes pfiesteria
				FOPU	GADNR is responsible for monitoring for coliform and oxygen etc. in coastal waters.
				FOPU	particularly during high tide events.
				FOSU	have had oil spills in the past. River discharge comes from Charleston area. no swimming areas within the park.
				FOFR	marsh has sewage-related bacteria problems that have been found by GA DNR that have resulted in beach closings. No swimming areas within the park (no public access)
			Determine status and trends in salinity concentrations / gradients in tidally influenced sites.	CALO	Park sits on science advisory panel for the Albemarle Pamlico Sound.
				CANA	Potential impacts to swimmers. Needed for health reasons. Swimming is one of our greatest resource activities
				CASA	NER on the intracoastal waterway is doing some monitoring.
				TIMU	Do have objectives in the WMP to maintain Class II waters (recreation)
				CUIS	
			Determine the frequency and duration of algal blooms.	CASA	no salinity gradient really present on site; system is primarily rainfall driven.
				CANA	dictates habitat suitability for all species.
				CAHA	no idea what goes on in tidal marshes
				FOPU	have algal blooms in the moat. Potentially of concern in the marsh as well. When it happens it's a big issue that halts all other park ops.
				FOPU	we're in pretty good shape here
Environmental Setting	Water Resources	Estuarine / Tidal Marsh	Determine the status and trends of contaminants in estuarine and tidally-influenced waters	FOSU	CHPI has one historical tidal creek that is currently fed by runoff from nearby golf courses
				FOFR	bacterial counts; possible public health concerns.
				CALO	Park sits on science advisory panel for the Albemarle Pamlico Sound.

Category			Monitoring Objective	Park	Notes
Environmental Setting	Water Resources	Groundwater	Determine the status and trends of nutrient levels in estuarine and tidally-influenced waters	CANA	Again, health effects for fishing, shellfishing, etc.
				CALO	state currently monitors shellfish. Waters have been closed due to contamination from septic systems
				FOFR	no upstream wastewater treatment plants. Perhaps nutrient loads are linked to bacterial levels, though.
				FOPU	related to marsh grass die-off. Could become higher if dieoff starts occurring on the park.
				CUIS	hydrology possibly affected by dredging operations
			Determine the status and trends of turbidity in estuarine and tidally-influenced waters	CUIS	horses and consequent effects on erosion rates.
			Determine the status and trends of groundwater quality	TIMU	monitored by the city and part of the florida inland marine fisheries monitoring.
				FOFR	haven't noticed any problems
				CAHA	no issues tha the Park is aware of
				CANA	affects seagrass-the basis of the Mosquito Lagoon ecosystem
				CANA	groundwater not mentioned in WMRP; of growing concern, however as Indian Lagoon is largely groundwater fed. Recent research has shown groundwater influx to be considerable in Mosquito Lagoon
				CAHA	although gw quality in shallow not good, most drinking water comes from deeper aquifer
				CHAT	we might reprioritize this with some additional research.
				FOFR	raise to 3?
				TIMU	don't really know. USGS is doing GW monitoring as well as SJWMD.
				CUIS	more interested in shallow than in deep groundwater
				OCMU	Need to check the degree to which the pond or river are groundwater fed. Possibly some leaching issues from the upstream junkyard. Also affects from adjacent urban pesticide / herbicide treatments
				KEMO	a bunch of unmapped springs on the mountatin. Discharge varies with precipitation.
				TIMU	big concern because of the amount withdrawls regionally.
			Determine the status and trends of groundwater quantity	CONG	USGS is currently monitoring this. 6 or 8 additional wells were put in to study the run of river effects to determine interplay between surface and groundwater. Don't yet know the specifics, but we know enough to make this a high priority.
Environmental Setting	Water Resources	Groundwater	Determine the status and trends of the amount of water in existing wells (discharge)	CONG	so closely tied to surface water system is very important.
				FOFR	three artesian wells on site. Another well used for watering. None are used for drinking water.

Category			Monitoring Objective	Park	Notes
				FOPU	have three existing wells. Five total on the island. All go down to the Upper Floridan aquifer. Scored a 4 with the proposed dredging work.
				FOSU	irrigation well at Fort Moultrie. Not used for anything else right now. Don't know which aquifer it's tapped into.
				CHAT	only historic wells on site. Not currently being used.
				CASA	Saint Johns Water Management District has one test well on site.
				CALO	no problems have yet been identified.
				CANA	NASA responsible.
				KEMO	no wells on site
				MOCR	three wells on site, with pipes in them
			Determine the status and trends of water storage levels in existing natural aquifers	CHAT	park is dependent on surface water for supplies; aquifers not an issue at this point.
				FOSU	but if the wells run dry...
				FOFR	haven't noticed anything yet.
				CONG	don't know how integrated aquifer systems might be with surfacewater systems at park.
			Identify changes in the freshwater groundwater table over space and time	CHAT	no indication that this is a problem because the river's base flows haven't changed over time.
			Identify changes in the saltwater groundwater table over space and time	MOCR	potentially raise to 3 if a reason is found to be concerned.
			I	TIMU	WRD recommended starting a groundwater monitoring program b/c of external threats to water quality and quantity.
Environmental Setting	Air Resources	Ozone	Determine the status and trends of atmospheric ozone concentrations	CUIS	Class II airshed.
				OCMU	monitoring station in Macon, which is a non-attainment area
				KEMO	Atlanta is doing the monitoring for this. We know we're in an unattainment area right now. Does this need to be a 4? Check on this.
				HOBE	need to check with tonnie's report to see if this should be a three or four. Same with all air quality
				CHAT	out of compliance. Getting data already from regional monitoring network. Ozone sensitive resources have been identified.
				CONG	air quality has been monitored for more than 20 years by SCDHEC. Long-term data set makes this a very valuable question to continue tracking. Park is a class II park.
				FOFR	risk of ozone injury to plants is low (ARD)
				FOPU	GADNR is doing ozone monitoring. Double check with ARD report.
		Particulates	Determine the status and trends of visibility	FOPU	Of concern. Industrial effluent upstream and west. When prevailing winds (typically easterlies) shift, this becomes a bigger problem. Also affects visitor experience.

Category			Monitoring Objective	Park	Notes
				FOSU	no issues because of proximity to coast.
				FOFR	haven't noticed any.
				CONG	non-issue
				CHAT	no vistas available; maximum sight lines for natural areas is across the river.
				HOBE	because there's no altitude on site, haze-related issues.
				KEMO	Urban smog is limiting visibility. Increasingly, you can't see Atlanta or Marietta from the mountain. Huge negative impact to visitor experience.
				OCMU	One of the visitor experience things is to stand on the Great Temple Mound and enjoying the vista. Might need to be a 4.
				CONG	yes...
				FOPU	also papermills are nearby.
				CHAT	local air quality not as big of an issue as regional air quality.
			Determine the status and trends of air quality near road corridors, campgrounds or areas of high visitor use.	FOFR	no campgrounds
				CALO	vehicles on beach
				KEMO	metro area AQ is likely much bigger impact.
				HOBE	Aniston Army Depot (fort McClellan) has an incineration facility that started up in March 2004 that is disposing of weapons-grade materials (i.e., nerve & biological agents). Located 45 miles away from the park.
				CHAT	only ozone is known to be a problem.
				CONG	local paper mills.
				FOPU	paper mills, shipping.
				FOSU	from things like paper mills and shipping.
				FOSU	effluent fry nearby industry might be a risk
				FOPU	effluent fry nearby industry might be a risk
Environmental Setting	Air Resources	Toxics	Determine the status and trends of Nitrogen and Sulfur deposition within the park	CASA	Acid rain impacts are of concern to prevent dissolution of coquina structures (such as the fort at CASA)
				CUIS	don't know susceptibility of tabby to toxics
				HOBE	see previous notes.
				KEMO	not sure right now if there's anything we can do at this point.

Category			Monitoring Objective	Park	Notes
Environmental Setting	Air Resources	Other	Determine the status and trends of light pollution	FOSU	don't have any problems right now, but if conditions change as Charleston grows, we might want to elevate scores. Primary sources of conatminants are from shipping industry and paper mills. Bigger boats expected in the future.
				CONG	because of mercury deposition, links to water quality issues.
				FOFR	Herculean chemical plant in Brunswick; paper mill nearby or well. On rare occasion, a noticeable odor is observed in the park (once or twice per year). Effects on resources unknown.
				CONG	important due to wilderness designation.
				FOSU	We don't own the beach, though it's a big problem for adjacent areas. Primarily day use areas; occasional night use at most.
				FOPU	day use only area. Astronomy clubs do use the park at night.
				CANA	directional light sources b/c of interference with turtle disorientation during nesting and hatchning
				CALO	not a big issue with turtles because of the lack of adjacent residential properties
				KEMO	has definitely increased over the last 30 years (anecdotal). Day use only park, though. Maybe a 0?
				OCMU	will be putting lights on I-16 through the park. 35 foot high lights with "non-polluting" types of heads. Not sure what, if any, effects might be on wildlife, though. DOT will be doing this study.
				MOCR	day use area only. No light-sensitive species on site.
				HOBE	not a big issue at this point.
				CUIS	sea turtles
			Determine the status and trends of the soundscape	CUIS	because of wilderness area and consequent need to maintain natural quiet.
				HOBE	because of park mission to preserve the sanctity of the battlefield, this is an important issue. Might be upgraded to 4 with a new management plan.
Environmental Setting	Air Resources	Other	Determine the status and trends of the soundscape	OCMU	getting louder, especilaly with I-16. Park has lost it's "sound of the swamp." Can be partially driven by losses in trees due to standing water & changes in hydrology. Major road widening of I-16 will allow for more traffic. Could provide info for the falline expressway debates as well as provide justification for installation of sound barriers.
				KEMO	in flight path for lockheed dobbins AFB in the Cheetham section of the park. Some railroads, too. Traffic noise typical of the metro area, but far enough away from interstate for that to be a problem.
				CALO	increasing effects of military overflights and those of privately owned aircraft. Baseline information would be very helpful.
				CANA	flyovers are a disturbance, but doesn't warrant a 4.
				CASA	interferes with the cultural mission of the park.



Category			Monitoring Objective	Park	Notes
Geologic Resources	Coastal Geology	Determine the status and trends of UV radiation interception	Determine the extent to which coastal shorelines change over space and time	FOPU	noise from HWY 80, overflights, shipping. Elevated to 3 because of the potential widening to HWY 80.
				FOSU	might increase as larger ships come in.
				CONG	important due to wilderness designation.
				CAHA	because of visitor use health impacts. (public safety)
				CAHA	active erosion at / near FORA.
				CALO	Park is doing beach renourishment to protect the lighthouse and other structures on the sound side. Already, one historic structure has been lost (coal shed) in the last hurricane. Renourishment site will be 100' x 1,700'.
				CANA	erosion causes loss of T&E habitat for beach mouse, etc.
				FOSU	Active erosion and accretion at Fort Sumter on (almost) all sides. Current management plans don't address this because it wasn't an issue at that time. Accretion area has really become a noticeable structure in last 7-10 years.
				FOPU	Active erosion happening along north shoreline. Potentially impacted by armoring and dredging operations. Also concerned about the lighthouse. If dredging happens, then new (bigger) ships will be coming through the shore.
				CUIS	State of Florida wants to dredge portions of the south end of the Island to benefit lands to the south within Florida; Back barrier Erosion; Habitat for T&E species. Most beaches on CUIS are accretional.
Environmental Setting	Geologic Resources	Coastal Geology	Determine the status and trends of longshore sediment budgets	FOPU	we are having aggradation on the north shore of oyster shells (about a foot a week) and the source is unknown. Highly dynamic, but not sure if it's a problem.
			Determine the status and trends of longshore sediment budgets	FOSU	tied into the accretion issue.
			Determine the status and trends of riverbank stability	FOPU	north shore.
				CONG	tied to hydropower generation in addition to natural processes.
				FOFR	buckling of wood revetment; hardened shoreline near fort built in the 1950s. No signs of current erosion at the Fort site, though.
				CANA	river question
				CHAT	tied into both tri-state water issues and hydropower facility management upstream. Water releases are causing erosion of riverbanks within the park boundaries.
				CUIS	soundside erosion and effects on cultural resources

Category			Monitoring Objective	Park	Notes
Environmental Setting	Geologic Resources	Geomorphology		OCMU	hydrologic modifications might be causing changes. There was a relatively large change in stream flow in 1994 following TS Alberto. Now a braided system
				MOCR	because of potential threats to bridge over Moores Creek.
				HOBE	likely far less erosion than historically present due to hydropower generation facility upstream.
				MOCR	because of potential threats to bridge over Moores Creek.
				TIMU	thinking specifically in Fort George area. Both erosion and sedimentation where channel is being choked off. Also sediment losses in areas adjacent to the dredge areas. Fairly massive geomorphic changes as a result.
			Determine the status and trends of sediment erosion and deposition in estuaries and lagoonal systems	CASA	Of interest to the Guanatanalano Matanzas estuarine reserve (NER), but not directly an issue for park resources.
				CALO	driven by hurricanes
				FOPU	potential for sediment inputs from wilmington Island area upstream in Oyster Creek drainage.
				FOSU	ties into accretion area near Fort Sumter.
				CANA	Active erosion in lagoon due to boat wakes. Also concerns about intracoastal waterway dredging.
			Determine the status and trends of sediment erosion and deposition in freshwater and tidal streams	CHAT	tied into both tri-state water issues and hydropower facility management upstream. Water releases are causing erosion of riverbanks within the park boundaries.
				OCMU	stream that goes between the mounds is filling up very quickly; had to move footbridge due to sedimentation. During high rain events, roads have been close to being washed over. Will likely lose road at some points.
				OCMU	this could be a four because of road placement issues.
				MOCR	because of potential threats to bridge over Moores Creek.
				KEMO	City of Marietta has proposed water management plans that would have altered stream channel geomorph.
			Determine the status and trends of stream channel shape and size	CHAT	tied into both tri-state water issues and hydropower facility management upstream. Water releases are causing erosion of riverbanks within the park boundaries.
				CANA	river question, so not applicable
				FOPU	not counting the Savannah because it's not within jurisdiction.
				FOFR	erosion concerns
				CONG	important piece of the puzzle to guide both research and management.

Category			Monitoring Objective	Park	Notes
Environmental Setting	Geologic Resources	Soils	Determine the status and trends of contaminant concentrations in soils	CONG	mercury
				FOPU	potential contaminants from former Navy dump sites???
				FOSU	we do have some lead contaminated issues around the Coast Guard facilities (lead paint based). No abatement planned. Liberty square has an abated superfund site. Monitoring wells installed at Liberty Squire. Monitored as a part of the cleanup activities.
				CAHA	two superfund sites. Also impacts from tires / oil, from ORVs.
				CUIS	Have some potentially hazardous material sites from cattle dips
			Determine the status and trends of contaminants (biological & chemical) in stream channel and salt marsh sediments	CUIS	related to salt marsh and the large salt marsh shrimpery
				TIMU	have had some sediment contaminant work done. Found metals both inside and outside the park (known issue). People are doing restoration work in areas of contamination where it might be contaminated. Perhaps elevate to 4 as a result?
				OCMU	because of both urban and junkyard-related contaminants.
				KEMO	we don't know if this is an issue or not.
				FOSU	At CHPI because of non-point sources of contaminants.
				CANA	Haven't found either metals or DDT in sediment samples during dredging operations.
				FOPU	two year study was done.
			Determine the status and trends of soil erosion	FOFR	bacteria?
				CHAT	could lead to other questions or changes in priorities if effectively answered.
				CONG	another important piece of the puzzle... Important for water quality questions.
				FOPU	don't know of any issues.
				FOSU	We have soil erosion on the forts, but it's more of a cultural issue.
				CHAT	this is a trail-management related issue.
				CAHA	orv impacts
				HOBE	High priority because adjacent logging activities have potentially increased erosive power of overland sheet flow on park resources.
				CUIS	dunes
			Determine the status and trends of soil fertility	HOBE	legacy of cotton and forest agriculture have impacted soil fertility, and thus might impact the ability of managers to restore the forest back to natural conditions.

Category			Monitoring Objective	Park	Notes
Weather and Climate	Weather and Climate	General	Determine the magnitude and frequency of earthquakes	CAHA	Dr. Parry showed that ORV affects breaks down grains of sand and impacts the ability to support natural vegetation.
				CAHA	check for concurrence with CALO.
				CANA	affects dune and beach mouse habitat, stability of the island, etc.
				CAHA	fire program at FORA.
				CHAT	affects river flow, sewage overflows, forest health...
				FOFR	related to fire management
				CONG	fire program related.
				KEMO	fire management / fire risk
				MOCR	because of fire management
				CUIS	Getting climate network station; Fire management.
				CUIS	Getting climate network station; Fire management.
				MOCR	because of fire management
				KEMO	fire management.
				CONG	fire program related
				FOFR	related to fire management
				FOPU	no prescribed burning; only suppression.
				CAHA	fire program
				CANA	already being done; weather people doing it at NASA. Need to know for determination of fire management strategies and prescriptions.
				CHAT	could have some side benefits for tracking trends in arson frequency.
Environmental Setting	Weather and Climate	General	Determine the frequency and distribution of lightning strikes	FOSU	we have quite a few of them here...
				FOFR	Pretty frequent; lose about one tree per year.
				CONG	could be important to help set proper burn frequency.
				KEMO	we have some... last fatality here was a lightning strike on the trail. Look toward modeling lightning strike risk for visitors.
				OCMU	could be relevant to fire planning.
				CUIS	fire
				KEMO	have had some hurricane damage from Opal. One tornado in the last 30 years.
				HOBE	hurricane damage happens as far inland as HOBE.
				CONG	CONG is in hurricane alley, so it gets hit by both hurricanes and tropical storms;
				FOSU	we have a hurricane plan. Potential to do the most damage to the park.

Category			Monitoring Objective	Park	Notes
			Determine the severity and frequency of droughts	CHAT	probable interaction with trees and forest management.
				CANA	affects dune and beach mouse habitat, stability of the island, etc.
				CANA	important for fire management
				CHAT	Drives fire management at the Park. Also affects river flow, sewage overflows, forest health...
				CONG	certainly of concern. Useful data set because multiple components of ecosystem are affected.
				FOFR	will be doing controlled burns once fire management plan is in place.
				KEMO	fire. Park mgmt is suppression and mechanical removal (no prescribed burning). Other than that, no observed long-term impacts of drought.
				MOCR	because of fire management / risk.
				OCMU	have been in a prolonged drought except for 2003.
				OCMU	evidence of them from SREL. Might increase if evidence of a larger population exists.
Park Resources	Species of Concern	Species	Determine the status, trends, and distribution of alligator populations	TIMU	have biguns with babies. Areas where located are not commonly visited, but they are located throughout the park.
				FOSU	at CHPI, we have one (Charlie).
			Determine the status, trends, and distribution of alligator populations	FOPU	reproducing on site.
				TIMU	we think we're outside the habitat / range.
			Determine the status, trends, and distribution of Atlantic and Southeastern Beach Mouse populations	CUIS	not aware of any on site.
				TIMU	FWS has it on the list, but our inventory says not.
			Determine the status, trends, and distribution of Atlantic sturgeon populations	CASA	need to check with the herp inventory on whether this species is in range at FOMA/CASA. Might need to downgrade to 0.
				CANA	Entire range consists of two counties
				CASA	Boundaries are the high tide line, so they shouldn't be an issue unless some nursery area is identified.
				FOPU	also potentially shortnose.
				CONG	has come up in proceedings with bridge reconstruction.
				OCMU	Historically present, but likely don't come up that far. No impoundments between the Park and the Atlantic, though.
				FOSU	it could be in the harbor, but nothing resident.
				MOCR	haven't seen any there. Think it's in range though. Might be too small of a system.

Category	Monitoring Objective	Park	Notes
	Determine the status, trends, and distribution of Bachman's Warbler populations	KEMO	rescore if present.
		OCMU	don't know if it's here
		TIMU	Park does employee that does bird counts. Also Audubon does regular counts in the park.
		CONG	don't know if it's present.
		CHAT	not showing up on any species lists at this point.
		FOFR	don't think it should be there.
		CASA	never heard of any mention of them.
	Determine the status, trends, and distribution of Bald Eagle populations	CHAT	park is a major flyway corridor with potential nesting habitat. Eagles have been spotted for foraging infrequently.
		CASA	no nests on site, but present.
		CANA	nesting in the park (already monitored at CANA by FWS).
		CALO	no nests on site
		FOSU	it could be in the harbor, but nothing resident.
Park Resources	Species of Concern Species	CONG	don't know if we have any breeding pairs, though.
		TIMU	nests present on the park.
		CUIS	Some nesting on site. State monitors.
		OCMU	increase score if land expansion occurs.
	Determine the status, trends, and distribution of Carolina bog mint populations	MOCR	Research / Monitoring currently being conducted by TNC to assess fire tolerance, but not population health / status. The FMP EA states that MOCR contains the largest population in the world.
		OCMU	don't think it's here
		CONG	we know it's present on the park. Largest populations around!!
	Determine the status, trends, and distribution of Diamondback Terrapin populations	FOPU	State species of concern.
		CANA	Population crashed at some point since 1979.
		TIMU	not nesting on NPS land, but within the authorized boundary.
		CUIS	documented site.
		FOSU	have been identified at the shoals at Fort Sumter, perhaps.
	Determine the status, trends, and distribution of Eastern Indigo Snake populations	KEMO	don't think we're in range for this one.
		TIMU	has been sighted. Commensal with the gopher tortise.
	Determine the status, trends, and distribution of Florida Scrub Jay populations	TIMU	Historically there, but the habitat is disappearing. Maybe score a 0. The scrub habitat present is marginal, and might improve with a fire program.
		CASA	not sighted in years at CASA

Category	Monitoring Objective	Park	Notes
Park Resources    Species of Concern    Species	Determine the status, trends, and distribution of Georgia aster populations	CHAT	We think that the recovery plan says that if you have it you ought to be monitoring it. Candidate species. Extremely limited range
		KEMO	It's at CHAT so it might be here.
	Determine the status, trends, and distribution of Gopher tortoise populations	HOBE	don't think in range.
		HOBE	check with Whit's inventory to see if park is in range.
		KEMO	don't think we're in range for this one.
		CUIS	may be having a habitat loss problem; burrows vital to a number of other species.
	Determine the status, trends, and distribution of Grass of Parnassus (spelling?) populations	MOCR	people have been sighted collecting seeds without permits.
	Determine the status, trends, and distribution of Least Tern populations	TIMU	might be nesting in the mud flats
	Determine the status, trends, and distribution of Least Tern populations	FOSU	perhaps in range, but habitat not in park.
		FOSU	it could be in the harbor, but nothing resident.
		FOFR	haven't been spotted yet, but at CUIS
		CASA	in the river, but not within park boundaries.
		CUIS	State monitors them
		CUIS	Part of the Index Network? (field data cards suggest "index" status)
		TIMU	State park does the monitoring because we don't have the nesting sites.
		FOSU	it could be in the harbor, but nothing resident.
		CASA	we do have them nesting there.
		CALO	CALO is an index beach, and under agreement with USFWS has monitoring requirements as a result.
		FOPU	don't nest on site.
		FOSU	Perhaps in range.
		FOPU	nest on site
		CONG	need to check with species list.
		CANA	State species of special concern
		CALO	check on distribution
		CASA	state species of special concern (FL)
		CHAT	don't know if it's here.
		HOBE	don't know if the species is present, but might migrate through.

Category			Monitoring Objective	Park	Notes
Park Resources	Species of Concern	Species	Determine the status, trends, and distribution of Red Cockaded Woodpecker populations	OCMU	strong active audubon group that could probably shed some light on that. If in NPSpecies, potentially a 3.
				MOCR	need to be aware of these if they settle. Habitat is present / being restored.
				FOSU	in the area, but we don't have any nesting in the park that we're aware of.
				TIMU	no habitat at the Park.
				CUIS	don't know if they're here
				CASA	only have a handful of pines.
				CANA	Not known within the Park, but is within range in Brevard County. Might need to elevate to 3 if habitat is deemed to be present.
			Determine the status, trends, and distribution of Sand Heather (Hudsonia tomentosa) populations	CONG	no active colonies, but might at some point because habitat is available.
				FOFR	pileated woodpeckers, too.
				CAHA	not sure of common name; located at WRBR.
Exotics Invasives Nuisance and Others	Plants		Determine the status, trends, and distribution of Wood Stork populations	CASA	no nests on site; no habitat management planned.
				FOFR	used to nest down the road. Have been sighted since. Don't have a rookery on site (or habitat for one??)
				CONG	on new property (dozens sited)
				CUIS	State does that
				OCMU	no nests on site.
			Determine the status, trends, and distribution of exotic plant populations	HOBE	privet expanding into cultural landscape. Could impact the ability of the Park to meet its cultural mission.
				OCMU	Privet and tree of heavin in both natural and cultural areas (on mounds)
				KEMO	we've got some areas that if we don't watch and nip it, we'll have a huge problem.
				FOFR	both privet and Chinese tallow are present.
				FOPU	Wisteria at CHPI has been a problem, but a good portion has been removed
				CHAT	Park has MANY exotic plants that need to be eradicated.
				CAHA	at FORA, plants from adjacent Elizabethan Gardens are expanding into park
				CALO	Phragmites on site.
		Vertebrates	Determine the extent to which the geographical / ecological ranges of armadillos, red foxes, and beavers are changing	CAHA	piping plover predation effects.



Category			Monitoring Objective	Park	Notes
Park Resources	Exotics Invasives Nuisance and Others	Vertebrates	Determine the status, trends, and distribution of deer populations	FOPU	potentially coyote, too. Cattle egrets as well.
				FOSU	only because of red fox.
				CONG	beaver is important.
				KEMO	yes on the coyotes.
				MOCR	coyotes recently spotted across SR421
				OCMU	more coyotes present on the park.
				OCMU	pretty sizable population and there might need to be some mgmt action in the future. Hunting along boundary.
				CUIS	maybe a 4
				KEMO	it is increasing. Haven't noticed any damage related to over browsing yet, though.
				HOBE	probably have an overabundance of deer.
			Determine the status, trends, and distribution of feral cat populations	FOSU	there are over at CHPI and at Fort Moultrie, but not an issue at this point.
				FOFR	if anything, going away on the island. Could increase as the island is developed. Hunting is happening nearby.
				FOPU	Park is currently monitoring.
				CHAT	some areas have high densities of deer; park not doing any active management though. After research, this might need to be reassessed.
				CHAT	we know they're at CHAT, but we don't know what, if any, affect they're having on resources.
				CASA	could be a problem with the Anastasia beach mouse.
				CAHA	affect piping plovers.
				CANA	could be a problem with southeastern beach mouse
				FOPU	not a big problem with them right now; not a reproducing population.
				FOSU	some at CHPI.
			Determine the status, trends, and distribution of feral dog populations	FOFR	have some
				CUIS	none present that we're aware of at this point
				OCMU	feral cats present, but no identified issues.
				HOBE	external hunting dogs, primarily
				KEMO	some loose neighborhood dogs, but that's all.
				MOCR	dogs "dumped" on site
				CONG	do have free-ranging feral dogs in the park.
				FOFR	historically had some. No current evidence of presence.
				CANA	having a big impact

Category			Monitoring Objective	Park	Notes	
Park Resources	Exotics Invasives Nuisance and Others	Vertebrates	Determine the status, trends, and distribution of feral horses	CAHA	Rooting of archaeological sites	
				KEMO	none spotted. Never been an issue here.	
				CUIS	Trampling and rubbing against structures	
			Determine the status, trends, and distribution of non-native bird populations	CALO	required by enabling legislation	
				CHAT	don't know if starlings are a problem here.	
				CONG	Emus!	
				FOSU	within the park we don't have an issue.	
				FOPU	becoming an issue. Lots of rock doves and sterlings. Use cultural resources (cannons) as nest sites. Pigeons in the fort, too.	
				CUIS	not an issue at this point	
				KEMO	brown-headed cowbirds, european starling both recorded. Rare and or incidental, though.	
				Determine the status, trends, and distribution of nonnative mammal populations	KEMO	one list says we have feral cats, but none have been recently seen. Coyotes have probably taken care of that.
					FOPU	also have black rats.
					FOSU	nothing other than cats present or noted to date.
					FOFR	hogs and cats. Prior hog damage recorded, but none currently.
					CHAT	don't know what others might be there / be a problem.
					CASA	none present other than hogs and cats (addressed in other questions)
					CANA	Basically hogs and cats. Coyote should arrive soon.
					CAHA	including nutria
					CAHA	piping plover predation effects
				CALO	piping plover predation	
				CASA	don't seem to have any impacts other than getting into garbage. No known impacts on turtles.	
				CANA	sea turtle and diamondback terrapin predation.	
				FOPU	have an issue with raccoons; also monitored during the deer counts. Have had rabies documented. Probably controls population, though.	
				FOFR	they rule the area	
				KEMO	they're here, but not causing any problems.	
				MOCR	higher because of human interactions in public areas.	
				HOBE	got them, but not a big deal for us.	
				CUIS	current management would not change.	

Category			Monitoring Objective	Park	Notes
Park Resources	Exotics Invasives Nuisance and Others	Vertebrates	Determine the status, trends, and distribution of raccoon populations	OCMU	as far as we know we don't have very many. Never seen one in the daylight, and rarely at night.
				TIMU	they're always around because it's an urban park.
		Invertebrates	Determine the magnitude, frequency, and extent of outbreaks of destructive insects	HOBE	southern pine beetle.
				FOSU	park does monitor for gypsy moths.
				KEMO	pine bark beetle is a problem. Getting hammered. Perhaps a 3?
				FOPU	shipping channel is a source of invasives.
				FOFR	have had outbreaks in the past
				CHAT	southern pine beetle.  Because CHAT is such an isolated area, the impacts could be changing over time regardless of changes in frequency. Might need to reassess the ranking depending on when / if sudden oak death syndrome shows up.
				CANA	newly discovered moth that eats prickly pears might be a growing problem in the future. Also the bromeliad weevil
				CALO	huge tick population at Shallowford Banks. WNV and Limes Disease are both of growing concern.
			Determine the status, trends, and distribution of exotic mussels	CHAT	Corbicula corbicula within the river.
				CASA	green mussel is present
				FOFR	rescore to 0 if green mussels or Corbicula are not possible in system.
				FOPU	Green mussel is out there...
				MOCR	no documented Corbicula, but possible.
				FOSU	Green mussel? If not rescore to 0.
				HOBE	I assume that corbicula is there, but at what cost to native resources.
				CUIS	green mussel has been found at the jetty
			Determine the status, trends, and distribution of nuisance / pest insect species (i.e., mosquitoes, ticks, fire ants)	CUIS	fire ants, definitely
				TIMU	county monitors on site at FOCA for mosquitoes.
				OCMU	visitor, employee, and destruction to CR.
				HOBE	huge tick problem. Might get better with prescribed burning.
				FOSU	mosquitoes and fire ants are a big problem here. Have worked with the County for pest control.
				MOCR	of interest, but not relevant to NR.

Category			Monitoring Objective	Park	Notes
Park Resources	Exotics Invasives Nuisance and Others	Invertebrates	Determine the status, trends, and distribution of nuisance / pest insect species (i.e., mosquitoes, ticks, fire ants)	KEMO	got em all.
				FOPU	Mosquito control ponds on site. Also fire ants.
				FOFR	visitor effects
				CONG	fire ants, ips, southern pine...
				CHAT	southern pine beetle, potentially mosquitoes and WNV in the future. Gypsy moth has been monitored by USFS in the past.
				CANA	monitoring being done by East Volusia County mosquito control
				CAHA	wnv and lime disease
				CANA	outstanding fishery in Mosquito Lagoon
				FOFR	reassess after the fish inventory
				FOPU	don't know currently. Perhaps a good indicator for marsh health.
Park Resources	Communities	Fish	Determine the status and trends of fish community structure, function, and composition	FOFR	reassess after the fish inventory
				FOPU	don't know currently. Perhaps a good indicator for marsh health.
				FOFR	reassess after the fish inventory
				CONG	could be of issue because of mercury.
				CANA	outstanding fishery in Mosquito Lagoon
			Determine the status and trends of fish health	HOBE	no reported fish kills that we're aware of. If there's a significant change, we would be getting information from the State.2
				MOCR	reassess all fish questions after inventory is complete.
				CANA	we need to protect outstanding fishery in Mosquito Lagoon
				FOFR	reassess after the fish inventory
				FOFR	reassess after the fish inventory
			Determine the status and trends of seasonal habitat use by anadromous fish species	FOPU	most would be in the Savannah River
				MOCR	eels present.
				KEMO	extirpated.
				HOBE	no anadromous fishes make it up this far in the river system.
				OCMU	no dams between OCMU and the Atlantic.
			Determine the status and trends of freshwater invertebrate community structure, function, and composition	FOSU	at CHPI maybe, unless it's not really freshwater.
			Determine the status and trends of freshwater invertebrate community structure, function, and composition	CANA	Very important to commercial and recreational harvesters

Category			Monitoring Objective	Park	Notes
Park Resources	Communities	Plants	Determine the status and trends of marine / estuarine invertebrate community structure, function, and composition	CHAT	we know the invertebrate data will be and currently are useful for policy-related decisions.
				CASA	ditches with freshwater are the only freshwater resources on site. Don't know what resources, if any, are present. Might need to be downgraded to 0 with more information.
				FOFR	Bloody Marsh
				CHAT	might be a 0
				CANA	oysters, clams, crabs
			Determine the status and trends of terrestrial invertebrate community structure, function, and composition	FOPU	blue crabs and shrimp an issue.
				CAHA	ghost crab populations, if they grow too high, could be a problem.
				FOSU	we do have some very old trees, though at CHPI.
				HOBE	some very large trees on site, but none formally designated as heritage trees.
				KEMO	had one; it fell down.
			Determine the status and trends of coastal dune plant community structure, function, and composition	CUIS	have a state record live oak
				CUIS	stabilize dunes
				FOSU	we don't own that
				CANA	has impacts for T&E species
				CASA	most of forested areas are maritime. Might need to be up- or downgraded after a vegetation map is complete for the park.
			Determine the status and trends of inland/upland forest plant community structure, function, and composition	CHAT	of issue because of forest pest outbreaks and fire management
				CONG	feral hogs might be having an effect on this by messing with regeneration of oaks.
				FOSU	don't know if we can classify areas at CHPI as forest.
				HOBE	would be managing for both species composition and forest structure under FMP.
				KEMO	we are losing pines because of pine beetle; community changes will likely occur as a result.
				OCMU	loblolly pine is giving way to hardwoods and exotics.

Category			Monitoring Objective	Park	Notes
Park Resources	Communities	Plants	Determine the status and trends of maritime forest community structure, function, and composition	CUIS	in enabling legislation
				FOSU	we don't own the maritime forest community, but it's a part of the viewshed behind Battery Logan. Perhaps elevate score because viewshed is a cultural resource mentioned in GMP or CMP.
				FOFR	would be of interest; wouldn't change management
				FOPU	yes. It is evolving now, but historically wasn't there.
				CALO	on Shackleford Banks, a horse-related issue. Forest distribution potentially being driven by grazing patterns.
				CHAT	CHAT is a series of patches, some of which represent relict populations. How those change over time might provide critical data to future management decisions.
				CANA	How might a vegetation map change over time?
				HOBE	needs to be addressed to determine whether the park is meeting objectives outlined in the fire management plan and the mission goals.
			Determine the status and trends of shell midden plant community structure, function, and composition	MOCR	not very large scale.
				HOBE	no shell middens on site.
				CUIS	Many shell middens on site.
				CANA	Unique plant community; combination of temperate and subtropical species) on Turtle mound and several other middens. Of historical importance as well.
				FOFR	no known shell middens on site
				FOFR	revise if identified during inventories
			Determine the status, trends, and distribution of rare plant species	CHAT	includes species like the pink lady-slipper that is of concern because of poaching.
				CALO	don't know what or if we have any.
				CUIS	habitats for many spp.
				CUIS	salt marsh dieoff an issue / concern
			Determine the status, trends, and distribution of salt marsh grass species (Juncus and Spartina spp.)	FOSU	Salt marsh grasses over at CHPI.
				FOFR	rescore to 3?; re: regional salt marsh die-off concerns

Category			Monitoring Objective	Park	Notes
			Determine the status, trends, and distribution of sea grass populations in intertidal and subtidal (nearshore) habitats	CANA	A lot of time and effort is spent by several agencies monitoring seagrass in Mosquito Lagoon. It is the basis of the lagoon ecosystem.
				FOSU	don't know if we have any seagrass in the submerged area. If not, need to change to 0. Probably elevate score if we do have it.
			Determine the status, trends, and distribution of state and federally listed rare plants or other species of local concern	OCMU	don't know if any have been found yet. Are some plants. No herps that we know of.
				KEMO	not aware of any on site. Rescore to 3 if we find some.
				CUIS	only one plant that is state listed
				CHAT	several / many state-listed species for which monitoring would be beneficial.
				CASA	no TER plants known on site.
				FOFR	revise if some are identified during the inventory
				FOPU	none have been identified. Elevate if one or more is found.
				FOFR	reassess after mammal inventory if necessary
Mammals			Determine the status and trends of bat community structure, function, and composition	CHAT	might change priority once more info is obtained from bat inventory. We know there has been a change over time.
				CASA	beach mouse bumps this one up.
			Determine the status and trends of small mammal community structure, function, and composition	CALO	does not include raccoons (too big)
				FOFR	reassess after mammal inventory if necessary
				CHAT	small mammal communities tied to wetlands restoration and exotic plant management activities.
	Herps		Determine the incidence and prevalence of Gopher Tortoise upper respiratory disease	CASA	important for the management of gopher tortises on site.
				TIMU	don't think it's moved this far north. If detected in the County then elevate.
				HOBE	don't even know if gopher tortises are present.
	Park Resources	Communities	Determine the status and trends of populations of aquatic breeding amphibians	HOBE	could be heavily impacted by water quality degradation and loss of suitable riparian habitat. Might need to be adjusted to a 2.
			Determine the status and trends of populations of aquatic breeding amphibians	CHAT	currently unknown
			Determine the status and trends of reptile and amphibian community structure, function, and composition	CHAT	herp communities tied to wetlands restoration and exotic plant management activities.
				CALO	would be interesting to know. Don't know if communities are affected by the dynamic landscape at CALO. Might need to be rescored as a high 2.

Category			Monitoring Objective	Park	Notes
Park Resources	Communities	Birds	Determine the status and trends of landbird community structure, function, and composition	CUIS	Turtles
				HOBE	driven by FMP
				FOPU	we know there is, primarily in the realm of exotics.
				CHAT	increasing. State is monitoring falcons.
			Determine the status, trends, and distribution of nesting diurnal raptor populations	FOSU	don't know if we have any.
				CUIS	includes osprey
				KEMO	IBA designation.
				OCMU	lots of migrants.
			Determine the status, trends, and distribution of rare and listed bird species	MOCR	might need to be lower because none are present within the parks. RCWs, however are located within the County and habitat is being restored at the park.
				CHAT	don't know much about the bird community as a whole.
				CALO	pipin plover monitoring important due to declining population
				CAHA	got lots of them
			Determine the status, trends, and distributions of populations of common bird species	FOPU	migratory. None nesting here.
				FOFR	woodstorks have been sighted. Only one or two species present (if at all)
				FOFR	not much active birdwatching at FOFR
				KEMO	tied to visitor uses.
			Determine the status, trends, and distributions of populations of migratory birds (neotropical and shorebirds)	CONG	globally important bird area. Already monitored by GA DNR.
			Determine the status, trends, and distributions of populations of migratory birds (neotropical and shorebirds)	FOPU	with migratory birds, they're only here for a short period of time. Not much management to do.
				CAHA	plovers
				CANA	not much habitat. Wilsons plovers are nesting at Merrit Island NWR, though so they might be present at CANA.
				CAHA	plovers, oystercatchers
			Determine the status, trends, and diversity of breeding bird populations	FOPU	painted buntings fall in this category.
				CHAT	implies certain types of habitat (and quality)
				CONG	globally important bird area.



Category		Monitoring Objective	Park	Notes
			FOSU	don't know what, if anything is nesting at the park. As nearby areas develop, park might become a refuge and score might need to be elevated.
		Determine the status, trends, and diversity of wading / shorebird populations	FOSU	maybe if shoal at Fort Sumter sees increased usage.
			HOBE	none nesting, but we get them during the migration season. Probably herons and storks present too.
			MOCR	great blue herons.
			CONG	will be gaining wading bird habitat with new lands.
			CHAT	in decline and CHAT has some of the last remaining habitat in the area for these species.
			FOFR	wood storks?
			CAHA	plovers...
			CASA	least terns and plovers are being monitored by the state with assistance from NPS staff. Screening off of nesting habitats is also done when found.
	Non-Vascular Plans & Fungi	Determine the status, trends, and distribution of lichen and moss populations	CALO	have some nice lichen communities.
	Habitats & Systems Beaches & Dunes	Determine the grainsize distribution, content, color, and mineral composition of sand on beaches.	CALO	nothing abnormal going on currently, but possibly an issue with lighthouse area renourishment on the sound side.
			CAHA	Beach renourishment is likely to be happening in large amounts upstream, particularly in communities. Need background data before that happens.
			CANA	not an issue as long as no beach renoursihment projects are happening.
			CASA	there is some upshore beach renourishment going on that can impact the beach. The source sand seems to be pretty similar, though. Perhaps a 3?
		Determine the status and trends of the amount of large woody debris on beaches	CALO	have some, but not much
Park Resources	Habitats & Systems Beaches & Dunes	Determine the status, trends, and quality of wrack on beaches	CALO	don't really have big wrack lines down here. Only minimally have wrack, so maybe a 0.
			CAHA	Critical for shorebirds and dune habitats.
			CASA	would be mildly useful.
			CUIS	habitat for shorebird nesting and foraging
	Wetlands	Determine the spatial extent and inundation frequency of seasonally intermittent pools.	HOBE	they do happen depending on the river level; might be important for herp reproduction.
			CHAT	some seasonally flooded impoundments within historic agricultural landscapes. Might provide habitat for wading birds and herps.
			CAHA	almost a 3.5

Category			Monitoring Objective	Park	Notes
Park Resources	Habitats & Systems	Rivers, Streams & Lakes	Determine the spatial extent, distribution, and diversity of wetlands and wetland habitats	CANA	primarily located in the swales between dune ridges. Provide habitat for many amphibian species not found elsewhere at CANA.
				CALO	salt marsh loss over time
				CAHA	wetlands at Cape Point have been ditched, flood gated... No longer a natural habitat. Presenting the 3rd highest priority for mgmt.
				CHAT	related to tristate issues.
				CANA	Are efforts at saltmarsh restoration succeeding?
				CASA	Salt marsh at FOMA
				FOFR	includes salt marsh, Bloody marsh too.
				CONG	all wetlands; talking about changes in types of wetlands which could impact other components of ecosystem.
				FOPU	Could be an issue with saltmarsh die-off. Also a question as to whether we are losing wetlands due to filling in
				HOBE	can be largely driven by beaver population.
				MOCR	in the process of doing wetland restoration
				KEMO	one intermittent wetland on th western boundary of the park. One more on the south end of the park
				CONG	visitor impacts could be of concern.
				CHAT	habitats highly degraded by discharge operation upstream. Tied to tri-state issues.
				CHAT	two small isolated fish ponds that are not connected to the river system; water quality not thought to be a significant problem for management
Park Resources	Habitats & Systems	Rivers, Streams & Lakes	Determine the spatial extent and quality of lake and pond habitats	CALO	Need to pay attention to salinity; not sure the degree to which they're tidally influenced
				CONG	Lakes, ponds & rivers are all included in management plans in all-encompassing "water resources". When flooded, all the same.
				FOPU	have two ponds. Mosquito control ponds. One has saltwater intrusion. Changing water chemistry can affect species distribution both in the water and in riparian areas.
				OCMU	Upstream of turtle pond, a junkyard is potentially leaching heavy metals and other contaminants. Priority would change to "4" pending findings of contamination.
				HOBE	the "beaver pond" on site is about 10 acres.
Park Resources	Habitats & Systems	Rivers, Streams & Lakes	Determine the spatial extent and quality of stream habitats. Includes tidal streams.	KEMO	lots of development; chemical plant upstream. Other urban effects. Might need to be upgraded to 4.
				CUIS	horses have a potential impact

Category	Monitoring Objective		Park	Notes
Park Resources	Habitats & Systems	Determine the status, trends, density and distribution of woody debris in streams.	OCMU	Downgraded from 4. Physical habitat degraded from natural conditions due to conditions outside Park Management control. Information would definitely help support compliance and policy documents however.
			CHAT	again, tied to FERC and water allocation issues. Sedimentation effects are a major driver. Physical habitat degraded from natural conditions due to conditions outside Park Management control. Information would definitely help support compliance and policy documents however. Management control. Information would definitely help support compliance and policy documents however.
			MOCR	storms that cause lots of CWD cause stoppage of flows.
			FOSU	probably a low priority.
			FOSU	2 right now. Could go up.
			FOPU	at least 3.
			FOPU	don't think this is an issue right now.
			CANA	drives closing actions / protection strategies. Important for outstanding fishery.
			CAHA	it's all nursery habitat, but nobody knows what for.
			CALO	SAV. Same reasons as for sea grass question.
			FOSU	don't know if we have either spawning or nursery habitats (probably not, though).
			CUIS	don't own those areas.
			HOBE	no known rare bird species.
			KEMO	IBA designation
			CHAT	management at the park is eliminating early-successional habitats on which several rare birds depend.
			CONG	park is a globally important bird area. And South Atlantic Coastal Plain Biosphere Reserve
			FOFR	rescore if necessary for the FMP
			FOPU	no historic forest.
			CALO	related to horse grazing
			KEMO	impact of beetles
			HOBE	needs to be known for FMP. Vertical structure necessary for burn planning.
			FOSU	not a heck of a lot of forest.

Category			Monitoring Objective	Park	Notes				
Park Resources	Habitats & Systems	General	Determine the status and trends of intertidal community structure, function, and composition (i.e., invertebrates, macroalgae, intertidal fish, hardshell clams...)	OCMU	related to the wetland issues and effects on historically dry-land species.				
				CUIS	critical nursery / foraging habitat. Also marsh health concerns				
				FOSU	New accretion area falls in this category. Don't know ecological importance yet for shorebirds.				
				CALO	foraging area for shorebirds; affected by ORV use.				
				CAHA	orv and bird foraging				
				CASA	do have a good least tern nesting area. Good habitat for them.				
				CANA	Concerned about the oyster reefs. Boat wakes, disease, predators, and competition from barnacles all issues.				
				FOPU	Includes all those in the marsh. Have had a clam seeding project.				
				FOSU	we have the submerged area.				
				HOBE	FMP and GMP driven.				
Park Resources	Habitats & Systems	General	Determine status and trends in land use or land cover types within Park boundaries.	KEMO	important because of changes to earthworks. If we have changes in forest type, accompanied by uprooting, etc. can do some potential damage. Currently no changes, though.				
				OCMU	land cover changes have been significant since 1994; changes in future might also be helpful to monitor.				
				CAHA	maybe 3.5				
				OCMU	large amount of wetlands on site.				
				MOCR	w / restoration, this becomes of hither interest.				
				KEMO	don't know of any right now. If deer populations grow, might need to elevate score.				
				HOBE	probably don't have an issue at this point, but could get worse if deer populations continue to grow.				
				FOSU	don't have a browsing problem.				
				OCMU	not yet seen, but deer populations are growng. Could be an issue down the line that we need to keep on the radar screen.				
				CUIS	horses and deer, particularly on salt marsh.				
Park Resources	Ecosystem Function	Energy / Material Flow	Determine the status and trends of ecosystem functions in wetlands.	CALO	all plant communities on Shackleford				
				CASA	some browsing pressure from deer is present.				
				FOPU	we have noted that there could be a problem.				
				FOFR	none right now.				
				Park Resources	Ecosystem Function	Trophic & Functional Guilds	Determine the extent to which (over) browsing pressure affects plant communities		

Category				Monitoring Objective	Park	Notes
Park Resources	Ecosystem Function	Trophic & Functional Guilds	Determine the status and trends of large carnivores (bobcat or bigger).		CHAT	large cats and bears have been spotted. Coyotes, too!
					FOPU	coyotes, foxes. No more than 3.
					FOFR	none present
					CAHA	red foxes
					CUIS	bobcats are predators on oystercatcher eggs
					OCMU	bears might be soon encroaching
					FOSU	we have a fox. With pups.
					HOBE	bobcats present
					KEMO	Did have a mountainlion report that was probably a bobcat.
					MOCR	bobcat family nearby
				Determine the status and trends of natural predators.	MOCR	coyotes are on the rise in the county. Mammal inventory didn't find any inside the park, but tracks outside. Fox populations fairly stable.
					KEMO	coyotes have likely increased of late. Would likely be more useful to park neighbors than to us.
					OCMU	only mammal predator we have is coyote.
					CALO	existing PMIS statement concerning raccoons trying to determine management thresholds for removal
					CASA	they're stable. Reports of bobcat family in the area.
Park Resources	Ecosystem Function	Trophic & Functional Guilds	Determine the status and trends of natural predators.		CANA	bobcats, raccoons, grey foxes, ghost crabs. Effects on marine turtles.
					FOFR	raccoons only
					CHAT	receive complaints about coyotes. Fairly isolated reports, though. Don't know enough about number or distribution at this point to know how important this issue is at this point.
				Determine the status and trends of pollinators within the Park.	CHAT	no inventory done yet.
					HOBE	
				Determine the status and trends of the prey base for large carnivores.	HOBE	bobcats are here, but we don't know how big the populations is
				Disease	HOBE	bee fungus, rabies is rampant in raccoon and skunk populations. Due to potential public health issues, this might become a four. Monitoring will be done by the State if bumped up.
					FOSU	not a high 2.
					CHAT	rabies???
					FOPU	could be some impacts with avian virus. Maybe sea turtles, too.
					CAHA	equine encephalitis, wnv

Category			Monitoring Objective	Park	Notes
			Determine the incidence and prevalence of wildlife diseases to which humans are at risk	CAHA	wnv
				CALO	WNV and Limes disease; none reported yet, though
				FOPU	rabies in raccoons. Hantavirus also has been identified. WNV, Lyme.
				FOFR	lyme disease, WNV. None yet found at FOFR, but have been found w/in animals in County
				CHAT	rabies???
				FOSU	WNV has been reported in Charleston.
				HOBE	see rabies note above.
Agents of Change	Park Resource Management	Maintenance / Trail Management	Determine the extent to which "down and dead" clearing activities affect animal populations dependent upon forest litter	KEMO	Lime, WNV. No indication that this has been an issue. Ticks and mosquitoes are there, though.
				MOCR	not doing this. Burning them.
				FOSU	actions primarily limited to removal of trees in cultural / maintained landscapes.
				FOFR	some done for fire prep.
				FOPU	not doing that
Agents of Change	Park Resource Management	Maintenance / Trail Management	Determine the extent to which mechanical removal of hazard trees affects natural ecosystem processes.	CHAT	recent EA said no; if that changes, we need to reassess.
				FOSU	maybe a 3, but we're not doing a lot of this.
				OCMU	large amounts of wood is removed as part of the FMP; as it's the primary method of fuel reduction.
				FOSU	don't really have sensitive plants at CHPI (probably), and we only do minimal trail clearing.
				KEMO	not that we know of.
				CHAT	in some cases positively affecting them.
				CALO	building a boardwalk
			Determine the extent to which park management actions affect sensitive plant communities (trail clearing, vegetation trimming, boardwalk construction).	FOFR	not doing much of this
				CALO	park currently sprays for Phragmites, but other than that exotic plants are not a big issue for the park.
				FOSU	don't have a lot of exotics in the park, though. Low 3 at best.
				OCMU	given impact to CR and amount of effort spent on this particular issue.
		Exotic Plant Management	Determine the extent to which exotic plant management affects populations of exotic species.		

Category			Monitoring Objective	Park	Notes
			Determine the extent to which exotic plants affect Park resources.	FOSU	Wusteria was growing on the cultural landscape.
				HOBE	Some populations taking over areas at the expense of native species.
				KEMO	right now not significant, but if unchecked, it could be.
				CHAT	We know that exotic plants are affecting native plant populations (competition / displacement).
			Determine the extent to which plants affect cultural resources.	CANA	not limited to cultural resources
				CANA	There is some plant damage to our archeological sites (roots growing into the mounds, etc.)but it is not a major problem and can be easily monitored. They actually provide more benefit by curbing erosion.
			Determine the extent to which plants affect cultural resources.	CHAT	some NHR sites that have plants-on-structure issues. Info could help guide management decisions / planning.
				FOPU	ferns growing in mortar and brick. Removed. Don't know of the effects of removal practices on mortar and brick.
				MOCR	used as erosion control on battle lines. Mold, mildew, fungus... also of concern.
				HOBE	Privet expanding into cultural areas / landscape.
Agents of Change	Park Resource Management	Exotic Plant Management	Determine the extent to which plants affect cultural resources.	FOSU	biggest issue is grass growing between the bricks. When removed it does damage to the historic structure.
				TIMU	plants growing on structures all over the place. Some ruins are overrun with plants.
	Fire Management	Determine the extent to which fire suppression, reintroduction, etc. affect status and trends of fire-adapted communities		OCMU	fire not to be reintroduced except to burn off the mound.
				HOBE	goal of fmp is to bring back the longleaf pine community.
				KEMO	we don't know the answer to this yet. Don't know if we have fire adapted communities on site.
				FOPU	not a fire adapted community here.
				CHAT	we know they're in decline. Many TER species are typical of fire-adapted ecosystems (Georgia aster, pink lady-slipper).
				CASA	this might change priority after the FMP is complete.
			Determine the extent to which mechanical fuel reduction mimics natural ecosystem processes.	CASA	no mechanical fuel reduction program
				CHAT	very important issue because mechanical fuel reduction is happening for safety reasons.
			Determine the extent to which prescribed burning (or lack thereof) affects plant populations?	KEMO	where this is done, it's the only management option.
				CASA	no prescribed burning program

Category			Monitoring Objective	Park	Notes
Agents of Change	Disturbance (Anthropogenic)	Land Use & Development	Determine the extent to which the removal of water control / blockage structures improve wetland hydroperiod and hydropattern	CHAT	will get worse with time due to history of fire suppression. Might become a 4 with more information.
				KEMO	have planted some pine trees on the eastern boundary near Bernhickey Road. Have done some plantings on the south portion of Little Kennesaw Mountain for erosion control purposes.
				MOCR	planting longleaves
				MOCR	wetland restoration taking place in the Savannah.
				CUIS	will be doing this in the future in the historic ricefields and causeways.
				CANA	need to know to evaluate wetland restoration efforts
				CAHA	could be an issue with Cape Point, and wit potential mitigation work around Oregon Inlet.
				CHAT	tied to johnson ferry wetlands \restoration project.
				CONG	historic hunt-club ditches that are affecting flows that someday might be restored.
				CALO	Park sits on science advisory panel for the Albemarle Pamlico Sound.
				CHAT	nice vague question... lots of impacts, though.
				MOCR	hog lagoon overflows
				HOBE	property to the north has a water withdrawal structure on a freshwater spring (culvert type of thing). Cistern type of thing.
				FOSU	we don't know if we have any sensitive species.
				HOBE	could easily be talked up to a three if there were an identified sensitive species that might or might not be affected by adjacent land use.
			Determine the extent to which land use / land cover affects sensitive species within the park.	CALO	Park sits on science advisory panel for the Albemarle Pamlico Sound. No big effects expected, though.
				CHAT	almost all of park is directly affected by adjacent land use.
				FOFR	probably not at all.
				CHAT	3+
				FOSU	Combination of concens with golf course and potential impacts if Boone Hall is developed.
				CUIS	could be a 0
				OCMU	post-rain peaking due to higher levels of impervious surface. Lots of urban development. Walnut creek on 303d list.



Category			Monitoring Objective	Park	Notes
			Determine the extent to which land use / land cover affects the delivery of sediments into streams estuaries	CUIS	horse driven effects in tidal creeks.
				HOBE	depends on the amount of logging in the area.
				KEMO	3 due to the amount of development upstream that's contributin sediment.
				CHAT	this is a major issue facing the park.
				FOPU	potential upstream development related inputs.
			Determine the extent to which roads throughout and surrounding the Park affect water flow within the Park.	FOPU	turtles and widening of HWY 80.
				CHAT	very high priority because it will have direct affects on water resources. Will likely cause other priorities to change.
				KEMO	roads probably don't impact water resources within the park.
				FOSU	no new roads planned for the area.
				CUIS	flow restrictions on causeways
Agents of Change	Disturbance (Anthropogenic)	Land Use & Development	Determine the extent to which the pattern of land use or land cover types affect Park resources	OCMU	16 has messed up a lot. Railroad too.
				CUIS	marinas
				FOSU	primarily urban in all directions.
				HOBE	external land use is changing, and could have large effects on water quality over time if/when changes occur (i.e., increases in high density chicken farming can affect water quality.)
				MOCR	because of sound and visual aspects.
			Determine the location and distribution of culverts and other flow restrictions within and surrounding the park.	CAHA	3.5
				CANA	will help with evaluating wetland / impoundment reconnection efforts
				CASA	none impacting park resources.
				CUIS	causeways
				OCMU	lots of trash entering as a result (from entire northern urban area). Trash removal / remediation.
			Determine the status and trends of adjacent land use.	OCMU	Macon is growing.
				CUIS	Land use in the area is changing FAST
				MOCR	related to land protection plans. Hog farm upstream has had a spill
				FOSU	could become a bigger issue if Boone Hall is ever developed.
				FOFR	changing to residential and golf.

Category			Monitoring Objective	Park	Notes
Agents of Change	Disturbance (Anthropogenic)	Land Use & Development	Determine the status and trends of habitat fragmentation within the landscape (of which the park is a part)	FOFR	possibly affecting deer and wood storks.
				FOSU	If Boone Hall next to CHPI (roughly 800 acres), this could affect resources at CHPI.
			Determine the status and trends of road density within and surrounding the park.	FOSU	not likely to change at this point.
				KEMO	pressure to widen and increase roads to support growing traffic needs.
			Determine the status and trends of road density within and surrounding the park.	OCMU	Fall line freeway is big issue facing the park.
				CONG	development pressure is coming; could be bumped up in the future.
			Determine the extent to which beavers affect natural hydrology.	FOPU	widening of HWY 80
				CHAT	we do receive complaints about them from adjacent neighbors. County receives complaints.
				CONG	don't know what the status of beaver in the park is at this point. Not a nuisance at this point.
				TIMU	might have beavers on the north side, but not in the park at this point. Maybe a 2?
				CUIS	none present
				KEMO	perhaps a 4. No resources at risk. Might have an impact on trail system.
		Water Resource Management	Determine the extent to which large impoundments and water diversion structures affect water resources within Park boundaries.	MOCR	Because of potential impacts on CR, this might need to be elevated to a 4. Beavers are newly active in the last 6-7 years. County has a beaver management specialist. Beavers are also affecting riparian trees. Elevated to 4 on 7/12 due to renewed impacts on CR.
				HOBE	have a decent beaver issue.
				HOBE	Large dam upstream. Affects hydroperiod and potentially water quality.
				OCMU	could be of greater importance as Atlanta grows.
				FOPU	we have a dyke inside the park that controls the water levels within the park. (Water control structure for the moat)
				CANA	need to know for impoundment reconnection and wetlands restoration occurring within the park
				CAHA	cape point
				CASA	has implications for water quality in the salt marsh
				FOPU	stormwater runoff from wilmington island.
				OCMU	All the garbage and highly polluted water into the park. High fecal coliform readings after big rain events. Several sewage spills within the park.

Category			Monitoring Objective	Park	Notes
Agents of Change	Disturbance (Anthropogenic)	Water Resource Management	Determine the extent to which water control structures and other flow restrictions affect water resources.	HOBE	as development happens, treatment facilities might increase.
				MOCR	Corps lock & Dam upstream manages for flood control. Don't know whether effects are CORPS driven or rain driven. Potentially downgrade to a 2.
				KEMO	might be some areas on the eastern boundaries of the park.
				HOBE	none exist at this time.
				FOPU	Ditches on park.
				CONG	need to check with what we said at CHAT.
				CANA	many current and historic mosquito control activities occurring within park.
				CAHA	cape point
				FOSU	not happening as much as historically.
		Coastal Zone Management	Determine the extent to which beach re-nourishment projects affects coastal geomorphology	FOSU	we have nearby docks and riprap around the fort. Don't know if they're affecting hydrology, though. Perhaps sediment transport, though.
				CAHA	at FORA
				CALO	b/c of new renourishment project.
				CASA	implications for the Fort (structure) at FOMA.
				CHAT	many docks that are out of compliance. Impacts need to be quantified.
				FOPU	dredging / channel deepening proposal in process.
				CANA	Ponce Inlet to the North of CANA may be affecting sand transport
				CAHA	oregon inlet
				FOSU	we know the jetties are leading to accretion.
				CUIS	because of Florida
			Determine the extent to which shoreline erosion control structures (revetments) affect erosion rates.	FOSU	beach by Fort Moultrie has revetments as does Fort Sumter. Combination of all structures is likely affecting erosion rates at the Fort.
				MOCR	because of cultural resources.
				CANA	Revetment immediately north of park may be causing erosion
				FOPU	if we find out it's not an issue we can downgrade priority.
				CHAT	some rip-rapped areas.
				CONG	bridges, Cedar Creek Canoe access has some revetment work that might have erosion issue.

Category			Monitoring Objective	Park	Notes
Agents of Change	Disturbance (Anthropogenic)	Other External Resource Management	Determine the extent to which external hunting pressure affects animal populations within Park boundaries.	CHAT	might be some adjacent hunting neare the northern units, but the affects (if any) on park resources are unknown. Might need to change to a 2, but as the area urbanizes, this problem will disappear.
			Determine the extent to which external hunting pressure affects animal populations within Park boundaries.	FOFR	we have had a shot deer at FOFR. Other than that no game species present.
				FOPU	no adjacent hunting. Except for marsh hens around our boundary.
				CANA	probably not an issue at CANA
				CALO	ducks only species of concern at this point.
				KEMO	only hunting allowed in Cobb County is bow hunting. Impact is likely too low to be an issue for KEMO.
		Visitor Use	Determine the extent to which external hunting pressure affects deer populations within the Park.	HOBE	changes in hunting regulations (upcoming) will likely reduce feral dogs and consequently increase deer populations. Could be upgraded to three depending on observed changes.
			Determine the extent to which boating activity affects submerged aquatic vegetation beds & associated communities	FOSU	unless we find out that we have seagrass beds somewhere where we have jurisdicion.
				CALO	also commercial boating activities.
				CANA	big impact to oyster beds and seagrass beds
			Determine the extent to which horseback riding on trails affects natural resources.	CANA	limited only to beaches right now. Might expand to Bill's Hill in the future in which case we might want to elevate to a 3.
				CASA	some occasional riding on the beaches but not often.
				HOBE	horseback riding is soon to be officially permitted on service roads and restricted to certain trails.
				KEMO	is allowed, but limited to certain areas of the trail system. Potential issues at stream crossings.
			Determine the extent to which human-animal interactions affect animal behavior, distribution, and abundance of animal populations.	FOSU	we don't have a whole lot (if any) human-animal interactions.
				CANA	raccoon feeding a problem. Manatees threatened by speeding boats.
				CASA	Of concern with birds on the beach
				CALO	raccoon feeding a problem
				FOPU	alligators in the moat.
				FOFR	not happening
				CHAT	goose feeding.
			Determine the extent to which human-induced disturbances and modifications affect soils	FOPU	two types of soils on site: marsh & man-made (dredge)
				CAHA	orv impacts
				CHAT	but interested...

Category			Monitoring Objective	Park	Notes
Agents of Change	Disturbance (Anthropogenic)	Visitor Use	Determine the extent to which human-induced disturbances and modifications affect soils	KEMO	haven't been farmed in fifty years.
				OCMU	could be an interesting question here because it's been going on for more than 1000 years.
			Determine the extent to which off-road vehicle use affects natural resources.	KEMO	no significant damage being done. b/c not allowed.
				HOBE	occasionally happens, but infrequently (two within the last year, and primarily kept to roadways). Park could become more vulnerable to ORV use after clearing actions related to the FMP. Might need to be later reevaluated.
				CUIS	includes both residents and NPS
				CASA	this is an known problem and is not allowed.
				CALO	ORV EA in process.
				FOPU	we occasionally have this issue. No trail.
				CHAT	an issue within the easements in the northern park units. Need management actions more than anything.
			Determine the extent to which the use of personal watercrafts, canoes, or other boat affects natural resources.	CHAT	some areas don't allow motorized vehicles. Lots of questions...
				FOPU	starting to get a little more of this. JetSkis are not permitted within the park.
				CANA	big impact to oyster beds and seagrass beds
				CUIS	will be increasing with addition of marina.
				FOSU	minimal, but people bring their own vehicles to sandy shoal at Fort Sumter.
				MOCR	canoe and kayak use on the rise.
			Determine the extent to which visitor use affects backcountry / Wilderness areas	MOCR	none designated at Park.
				HOBE	no designated wilderness. Backcountry areas are not very well utilized.
				OCMU	Lamar unit might be considered backcountry
				CANA	minor impact
				CALO	Shackleford is a proposed wilderness area. Growing number of boats accessing island, though (as many as 400-500 on the 4th of July).
			Determine the extent to which visitor uses affect surficial hydrology	FOPU	probably just seasonal changes.
				FOFR	not an issue
Agents of Change	Disturbance (Anthropogenic)	Visitor Use	Determine the extent to which visitor uses of natural areas affect animal behavior, distribution, and abundance of animal populations	CHAT	could be important for trails management, especially since CHAT's humans come with dogs.

Category			Monitoring Objective	Park	Notes
			Determine the extent to which visitor-induced disturbances affect freshwater resources	FOFR	not a known issue
				CALO	ORV effects.
				CANA	shorebird interactions. Rookeries in jointly managed areas have had problems with people scaring off birds
				FOPU	have some issues with litter, and potentially wildlife.
				CONG	fishing impacts. Litter. Overeruse of banks. Bates old river, once acquired, will have a ton of use. Right now overused and not public property.
			Determine the extent to which visitors affect native vegetation.	CUIS	not a big problem because of low visitation
				OCMU	they're fishing. During floods, connected to the river so some debate as to whether or not that's an issue. Number of fishermen changes drastically over time.
				KEMO	social trail problem exists at the park, particularly with adjacent land users.
				CUIS	not a problem at this point
				FOFR	in Bloody Marsh?
			Determine the extent to which visitors affect natural resources.	FOPU	fishermen trampling spartina, but it comes back every year so it's probably not a big problem.
				CANA	dune impacts and sea grass impacts primary concern
				CALO	probably not as much as horses are.
				CAHA	dunes
				CALO	ORVs
			Determine the magnitude and extent of erosion in areas of high recreation use	FOFR	potentially cultural impacts only
				KEMO	we know this is primarily on the trails, also impacts on earthworks.
				FOSU	don't really have any natural resource degradation; only cultural.
				FOSU	no high recreation use areas.
				KEMO	trail on little Kennesaw is a problem.
Agents of Change	Disturbance (Anthropogenic)	Visitor Use	Determine the magnitude and extent of erosion in areas of high recreation use	MOCR	with canoe access this could become an issue in the future.
				CUIS	not a problem at this point
				CHAT	high visitor use having known impacts.
				CONG	may become an issue in the new area.
			Determine the number, distribution, and extent of human-impacted sites (incl. trails, campsites, boat launches...).	CHAT	social trails and encroachments make this a large evolving issue.

Category			Monitoring Objective	Park	Notes				
			Determine the status and trends of the amount, type, and distribution of visitor uses	FOFR	not changing				
				CASA	boating access and socatial trail creation, particularly in due system.				
				CUIS	increased boating activity is happining and is expected to continue.				
				KEMO	social trail creation				
				FOSU	could become of higher interest as visitation increases. Primary concern is litter.				
				HOBE	no campsites, boat launches... no noticeablesignificant impacts from overuse of trails or other high use areas. Could change if visitation increases.				
				HOBE	this will change as the area around develops and trail use increases. Horse use is starting to increase.				
				FOSU	visitation has been increasing.				
				KEMO	more of 'em. If there is a change, it's an increase in usage of the trail system.				
						Resource Extraction	Determine the extent to which channel dredging affects hydrology.	CANA	boaters of concern, in particular
FOPU	are seeing an increase in jetskis and kayaks.								
CASA	not noticing or concerned with hydrologic issues at this time.								
CALO	going to be dredging this february. Beaufort Inlet is dredged.								
CAHA	Dredging is all done outside of our boundaries. Dumping of sediments and noise are bigger issues.								
HOBE	don't know if this is even happening.								
OCMU	Ocmulgee is navigable to Macon, but USACE has not dredged for many many years. Not likely to happen any time soon for political reasons.								
HOBE	don't think there is any dredging going on at this time.								
FOSU	potential effects on shoal generation at Fort Sumter.								
		Resource Extraction	Determine the extent to which channel dredging affects natural ecosystems.					CASA	has ramifications for both water quality and sound quality.
				CONG	dredging of Congaree River has been proposed for sight-seeing boat traffic.				
				FOPU	crabbing. Only approved area for recreational shellfish harvesting in Chatham County.				
				CASA	could be some shellfishing issues, but magnitude (if any) is unknown at this time.				
				CANA	All we know is that it's significant and increasing				
				FOSU	not happening within the Park.				
				Agents of Change	Disturbance (Anthropogenic)	Resource Extraction	Determine the extent to which commercial and recreational shellfish harvesting affect park aquatic habitats.		

Category			Monitoring Objective	Park	Notes
			Determine the extent to which finfishing and shellfishing within park boundaries affect native populations	FOSU	FOSU is an active recreational fishing area. Don't know the impacts, but they're assumed to be low compared to overall Charleston Harbor.
				HOBE	lots of summertime fishing going on.
				MOCR	after fish survey?...
				CANA	Increasing to alarming levels and may already be negative impact
				FOPU	crabbing.
			Determine the extent to which groundwater extraction affects riparian / salt marsh wildlife	FOFR	fiddler crabbing at Bloody Marsh
				FOPU	this is more driven by surficial aquifer and not at as much risk due to dredging operations.
				FOFR	don't see this yet.
				CONG	Required to know as a part of the FERC relicensing process upstream.
				CHAT	we don't know if this is an issue, but it might be at the groundwater-river interface where the park's wetlands primarily exist.
				CAHA	don't know if there's an issue yet.
				HOBE	if they were, it would be high priority.
					This might become a two.
				CUIS	Only interested in the shallow aquifer; deep (Floridan) not an issue.
			Determine the extent to which groundwater extraction affects water tables.	CUIS	Maybe a 4?
			Determine the extent to which hunting pressure within the park boundaries (permitted and poaching) affects animal populations	FOFR	mostly gw-fed system
				FOFR	not permitted / happening
				FOPU	we do have some poaching, but not much.
				CHAT	poaching happens
				CANA	Good to know impact on duck populations since some are decreasing on a continental basis
				CUIS	hunting is allowed; deer and hogs only
				HOBE	Poaching does happen, but the extent of impacts is not known.
Agents of Change	Disturbance (Anthropogenic)	Resource Extraction	Determine the extent to which illegal harvesting affects populations of commercially valuable plant species (i.e., ginseng, goldenseal, bloodroot).	HOBE	there are some local ginseng harvesters in the area...
				FOFR	don't think any are present



Category			Monitoring Objective	Park	Notes
			Determine the extent to which native vegetation is harvested	CONG	paw paw and muscadine
				CANA	sea oats harvesting?
				CAHA	blueberries
				HOBE	some poaching going on, but not at a significant level (as far as we know)
			Determine the extent to which off-shore and adjacent fishing pressures affect park resources	FOSU	not happening within the park
				FOSU	likely minimal because park habitat is so small.
				CUIS	there are turtle effects.
				CANA	particularly large problem with sea turtles
				FOPU	adjacent shellfishing, crabbing. Do have some crabbing (commercial) on adjacent lands that does spill over inside park boundaries.
				FOSU	In Charleston area, definitely an issue. Not an issue right now at the Park.
Agents of Change	Disturbance (Anthropogenic)	Resource Extraction	Determine the extent to which regional water withdrawal and impoundment affect local water quantity.	FOSU	groundwater extraction effects.
				FOPU	mostly gw-fed system
				FOFR	mostly gw-fed system
				CONG	Lake Murray dam upstream on Saluda River.
				CHAT	this really is the tristate issue. Also related to FERC issues with the Morgan Falls Dam hydropower facility.
				CAHA	Okracoke, the town; the wastewater treatment plant is on Park property
				KEMO	all regional withdrawal is occurring downstream.
				HOBE	gage I park (USGS)
				OCMU	not high priority, but reservoirs are upstream. (macon water authority)
				MOCR	USACE facility management upstream for flood control. Score might go up to 3 or 4 with FERC relicensing or if impacts found to be negative.
			Determine the extent to which sand mining affects natural systems.	HOBE	don't know of any that might be going on.
				CUIS	Sand mining happens on Raccoon Keys
				CAHA	not a current issue
				CHAT	maybe a four?
			Determine the extent to which scientific collection and poaching affects sensitive plant populations	HOBE	some poaching going on, but not at a significant level (as far as we know)
				FOSU	potential is there, but not an issue right now.
				MOCR	poaching has happened
				MOCR	poaching has happened
			Determine the extent to which surface water extraction affects Park resources.	MOCR	not aware of any issues.

Category			Monitoring Objective	Park	Notes
			Determine the frequency and intensity of sand dredging.	HOBE	not sure the extent to which this is a problem but at least one adjacent landowner is withdrawing surface water from local springs.
				CHAT	tristate
				CAHA	0?
				CAHA	isabel inlet
				CHAT	some sand dredging areas happening.
				FOSU	For Fort Moultrie area, this happens once ever 7-10 years. Dredging happens in the harbor all the time. Definitely affects resources at the park.
		Contaminants Exposure	Determine the extent to which air chemistry affects freshwater (lake and pond) resources	CUIS	nearby paper mills could be a source of contaminants.
				CONG	we know that mercury is getting into the water and into the fish (atmospheric deposition). Methyl mercury contamination appears to be an issue. Right now being studied by SCDNR. Might change to a 3 or 4 based on results.
			Determine the extent to which air quality affects soil resources	FOPU	likely not an issue.
				CONG	related to mercury deposition. Wetlands like CONG are mercury sinks.
			Determine the extent to which atmospheric deposition of contaminants affects water resources.	CUIS	don't know if this is an issue at this point
				KEMO	we don't know the answer right now.
Agents of Change	Disturbance (Anthropogenic)	Contaminants Exposure	Determine the extent to which bioaccumulation and biomagnification affect park resources.	CUIS	don't know if this is an issue.
				OCMU	junkyard effects.
				CONG	could go up to a four based on results of current research.
				FOPU	Mercury issue. We have a lot of recreational shellfish harvesting.
			Determine the extent to which degraded water quality impacts natural resources	CAHA	certainly for visitor use
				CHAT	water quality issues cause changes in visitor use patterns
				CUIS	impacts of horses
				OCMU	yes. Not currently in any management plans (no GMP at this point). Should be included in future documents due to potential public health hazards.
				MOCR	upstream development pressure
				KEMO	visitor uses not in water here.
				HOBE	might need to be higher based on Tonnie's report.

Category			Monitoring Objective	Park	Notes
			Determine the level of risk for eutrophication due to water quality degradation	CUIS	check with ARD report
				CHAT	don't know yet if this is an issue.
				CONG	would bump up to a four if there is evidence or reason to believe ozone injury is occurring due to mission of park.
				FOFR	not at high risk.
				CALO	no
				CUIS	lots of moving water
				TIMU	not really a problem because of diurnal flushing.
				CAHA	check for concurrence with CALO.
				CHAT	Chattahoochee is on brevard fault. Not very active if at all...
				FOSU	1886 Charleston had largest earthquake on record east of the Mississippi.
Agents of Change	Disturbance (Natural)	Disturbance / Recovery	Determine the extent to which earthquakes affect park resources	FOSU	Perhaps with sediment sources upstream of the Charleston Harbor. Might be more driven by dredging, though.
				FOPU	potentially an issue as geomorph changes in Savannah River. Probably no changes in Oyster Creek.
				CHAT	same note as above
				CAHA	perhaps would be important at streams at Okracoke
				CANA	river question, so not applicable
				OCMU	yes, it is, and it's a problem.
				KEMO	some erosion happening on both Ward and Noses Creeks.
				KEMO	Vegetated to the streambanks just about everywhere. We are losing vegetation in some areas.
				FOFR	no riparian vegetation.
				FOPU	not applicable to tidal creeks...
			Determine the incidence, and severity, and distribution of mortality, disease, and insect pests (native and non-native) in forest communities	CHAT	WRD has identified this is a need related tristate issues.
				FOFR	currently monitoring for gypsy moths.
				FOPU	don't think impacts are that great at this point. Other question included public health concerns.
				CHAT	forest is highly stressed; degree of vulnerability to stressors would be helpful to mgmt.
				KEMO	we know we have a huge problem with this and are losing forest trees.
				HOBE	same as above.

Category			Monitoring Objective	Park	Notes
			Determine the magnitude, frequency, and extent of flooding events	HOBE	affected by the dam upstream.
				KEMO	no impacts at KEMO
				OCMU	either drought or frequent 100 year floods...
				CALO	related to hurricanes
				FOFR	don't know if there are changes
			Determine the magnitude, frequency, and extent of high tide events (storm surges, seasonal changes).	CHAT	full-on natural flooding not going to happen due to urban interface. Ecological significance of those that do happen is more of a research question. Shift in all is happening right now.
				FOPU	perhaps a 3?
				CALO	related to hurricanes
				CASA	FOMA structure highly susceptible to structural damage resulting from changes in sea level.
				CAHA	2.5
Agents of Change	Disturbance (Natural)	Disturbance / Recovery	Determine the status and trends of early successional species in parks.	FOFU	primarily early succession on dredge spoil islands (no more than 100 years old)
			Determine the status and trends of early successional species in parks.	CHAT	management actively selects against early successional species. Don't know what species would realistically be expected to exist within the 2000 ft. corridor.
			Determine the status and trends of flow dynamics (hydroperiod, quantity, peak flows) of aquatic systems including rivers, lakes and ponds, wetlands, and estuaries, and ditches.	HOBE	tied to fire management program. Could be higher.
				KEMO	no impacts at KEMO
				MOCR	erosion during swift water.
				CHAT	this is the tristate issue.
			Species Invasions Determine the extent to which exotic and other animals affect cultural landscapes / resources	FOFR	not much rooting going on.
				CONG	hogs.
				FOSU	pigeons nest in Case Mates at FOSU.
				FOPU	Exotic bird and rat issues. If Armadillo get established, perhaps elevate to 4.
				CALO	Nutria do some digging.
				CANA	rooting of archeological sites
				KEMO	no species present that are doing this damage.

Category			Monitoring Objective	Park	Notes
Agents of Change	Disturbance (Natural)	Species Invasions	Determine the extent to which exotic aquatic plants affect native plant and animal communities	HOBE	armadillos are everywhere. Not sure the extent to which rooting is effecting, but they're everywhere.
				OCMU	hogs
				CUIS	hog rooting; horses (trampling, rubbing against structures)
				CUIS	do have alligator weed in freshwaters.
				HOBE	milfoil is not in the area yet, but could become a huge issue if it found its way into the beaver pond.
				OCMU	don't know if there are any.
				CALO	don't know if this is a problem
				CHAT	we know that they're there - in the mainstem, isolated ponds, AND bull sluice lake.
				CONG	Alligatorweed, water primrose, and Asian spiderwort on site.
			Determine the extent to which exotic fishes affect native fish communities	FOPU	don't know of any exotic fish here.
		Species Invasions	Determine the extent to which exotic fishes affect native fish communities	CHAT	recurrent issue, and some particularly nasty species (i.e., rice eels).
				KEMO	don't know if we have any or what their impacts are. Cyprinella lutrensis (red shiner) is probalby present, though.
				OCMU	unknown
			Determine the extent to which rooting pressure from feral hogs affects plant community structure, function, and composition.	OCMU	focus is primarily on CR, but if there's plant impacts,
				CUIS	getting rid of hogs no matter what
				CANA	having a dramatic effect on swails.
				CAHA	doing damage along the runway
				FOFR	non at site now.
			Determine the magnitude and extent of hog-induced habitat degradation	CANA	again, hog impacts are a big problem; especially on wetlands and dependent amphibians. Some of these areas and associated species are rare in the park
				CHAT	no hogs on site.
				CUIS	wouldn't change management
				OCMU	play bloody hell with CR.
				HOBE	as far as known, not present at HOBE
		Changing Habitats	Determine the extent to which changes in coastal dune habitats affect dependent plant and animal communities	CUIS	also stability of the dunes

Category			Monitoring Objective	Park	Notes
Agents of Change	Disturbance (Natural)	Climate Change	Determine the extent to which changes in habitat quality / availability affect breeding land birds and shore birds	TIMU	all dune questions will change priorities when TIMU acquires American Beach.
				CALO	no T&E species of concern.
				CAHA	this is in the enabling legislation for areas without recreation values. "wilderness"
				FOPU	Not a lot of dynamics here in the park.
				HOBE	driven by FMP
				FOSU	Fort Sumter accretion area could be important bird habitat.
				MOCR	some nesting species are present that visitors come explicitly to see (i.e., prothonotary warbler).
				FOSU	it is changing and we're worried about the Fort. In management documents frequently.
Agents of Change	Disturbance (Natural)	Climate Change	Determine the extent to which global warming affects park resources	CALO	related to sea level change

## Figures

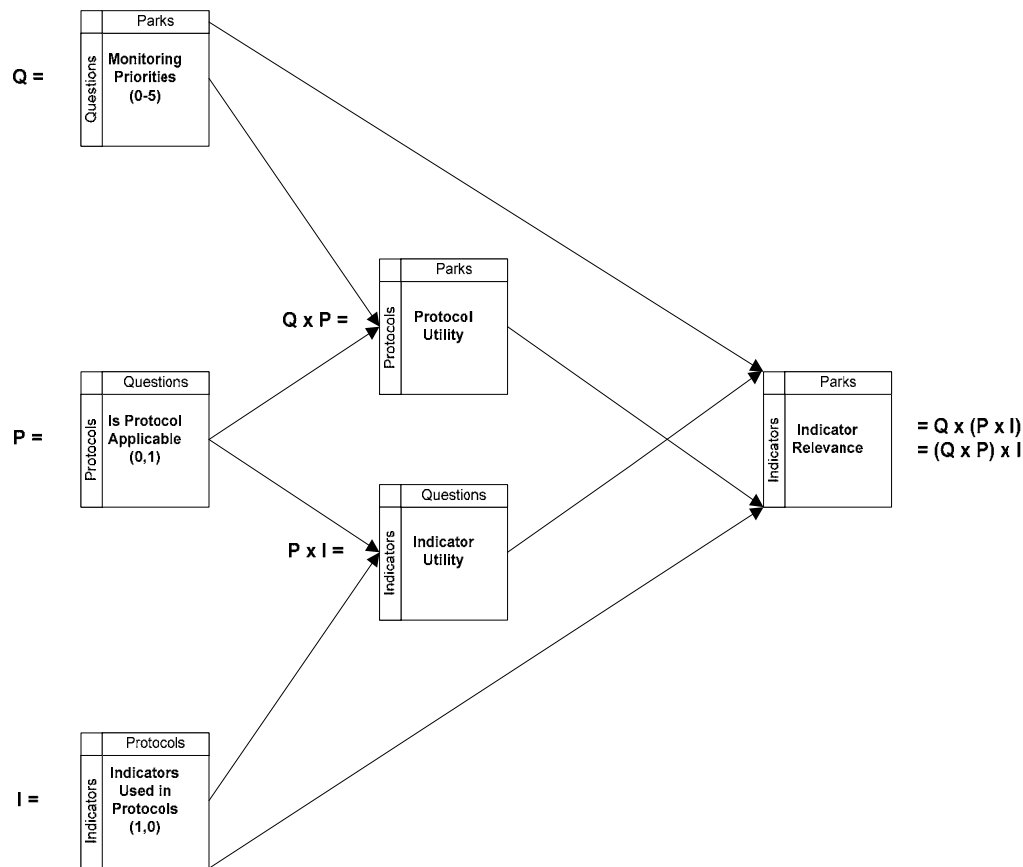


Figure A9-1. Data sets used for analysis of indicator relevance in the Southeast Coast Network.

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